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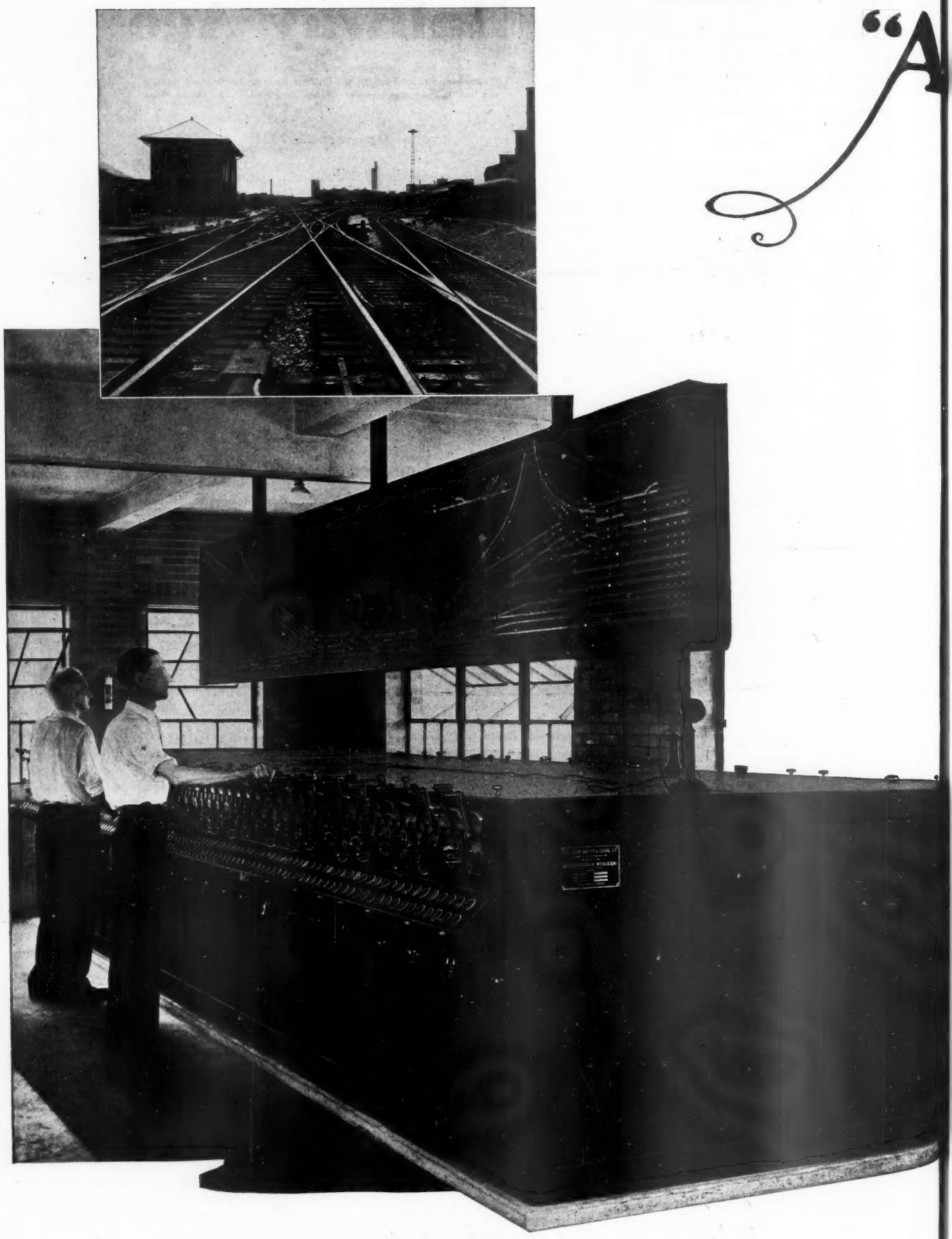

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RAILWAY AGE

Changes in Prices of Railroad and Industrial Stocks

In the hearings before the Interstate Commerce Commission in the rate advance case now pending, and also elsewhere, there has been a great deal of discussion as to whether the condition of the railroad industry is worse than that of other industries. This question has been raised, of course, because representatives of some classes of shippers have opposed advances in rates upon the ground that all industries are suffering from the depression, and that the railroads are no more needy than other industries.

The strongest protests against advances in rates have come from the agricultural industry, and unfortunately there are no stock market prices indicating the condition of agriculture which can be compared with prices of railroad stocks. The current prices of railroad and industrial stocks, when compared with prices throughout the last one-third of a century do, however, plainly show that, in the opinion of investors, most of the industries of the country are at present in a relatively much better condition than the railroad industry, and therefore could stand an advance in freight rates much better than the railroad industry could stand to be refused it.

Railway Stocks Lowest Since 1897

On September 19, 1931, the average price of the stocks of the leading railways included in the averages that have long been computed by Dow Jones & Company was the lowest since April, 1897. The Dow Jones average for April, 1897, was $48.12, while for September 19 last it was $53.08. Both of these averages were much higher than they would have been if the stocks of all railroads had been included in the computations.

The changes in the Dow Jones averages of railroad and industrial stock prices from April, 1897, down to the present time are highly significant because of the light they throw on the changes that have occurred during this long period in the estimation in which railroad and industrial stocks have been held by the investing public. In 1897, when the "low" for railroad stocks was $48.12, the "low" for industrials was $38.49. During subsequent years when business, with occasional setbacks, was improving, prices of stocks advanced until in 1906 the railroad stocks attained a "high" of $138.36, and the industrials a "high" of $103.00. In the brief depression of 1908 the railroad average reached a "low" of $86.04, and the industrial average a "low" of $58.62. In 1909 the rails reached a "high" of $134.46, and the industrials of $100.53. Following the mild depression of 1914 and 1915 the rails attained an average in 1916 of $112.29, and the industrials an average of $110.15.

As these figures indicate, throughout the long period of 21 years from 1897 to the adoption of government operation of railroads at the beginning of 1918 the average price of railroad stocks was higher than the average price of industrial stocks. In 1919, however, when the railways were under government operation, the highest average for their stocks was $91.13, while the highest for the industrials was $119.62. This was the first time that the industrial average exceeded the railway average, but, excepting in 1921, the prices of industrial stocks have ever since averaged higher than the prices of railroad stocks. The "low" for the railroad stocks in 1921 was $65.52, and for the industrial stocks, $63.90. From these low points the railroad average climbed to a maximum of $189.97, and the industrial average to a maximum of $381.17, in September, 1929. During the two years from September, 1929, to September, 1931, the railroad average drifted downward until it reached on September 19 the "low" already mentioned of $53.08, while the industrial average drifted downward to $111.74.

Industrial Average Higher Than in 1921

The foregoing figures disclose some remarkable facts. Between 1919, when the railroads were under government operation, and 1921, the last year of severe depression, the average price of railroad stocks declined less than the average price of industrial stocks. Railway earnings were very poor in 1921, but under

the labor provisions of the Transportation Act, railway wages were reduced in that year, the rate making provisions of the act held out encouragement to investors, and these undoubtedly were the reasons why the prices of railroad stocks declined less than the prices of industrial stocks. Since then the prices of railroad stocks have both increased less and declined more than those of industrial stocks. The advance in the railroad average from the "low" of $65.52 in 1921 to the "high" of $189.97 in 1929 was $124.45, or 19 per cent. The advance in the industrial average from the "low" of $63.90 in 1921 to the "high" of $381.17 in 1929 was $317.27, or 497 per cent. The decline in the railroad average from the high of $189.77 in September, 1929, to $53.08 on September 19, 1931, was 72 per cent, and made the railroad average 19 per cent less than it was at the lowest point in 1921. The decline in the industrial average from the high of $381.17 in September, 1929, to $111.74 on September 19, 1931 was 71 per cent. As the industrial average at the lowest point in 1921 was $63.90 and on September 19, 1931 was $111.74, it was still actually 75 per cent higher on the latter date than it was at the lowest point it reached in 1921.

It will surprise many persons who believe that other industries are suffering relatively as much as the railroads during the present depression to learn that the average price of railroad stocks is now about 19 per cent lower than it was during the worst part of the depression of 1921, while the average price of industrial stocks is still 75 per cent higher than it was then. The principal reason why the prices of railroad stocks are now the lowest in thirty-four years is that the current net earnings of the railroads are the worst ever reported. During the last depression the railroad's were "turning the corner" by the middle of 1921, while since the middle of 1931 they have been making new low records. In June, 1921, their net operating income was $51.067,000, while in June, 1931, it was only $50,163,000. In July, 1921, their net operating income was $69,324,000, while in July, 1931, it was only $56,535,000. In the entire year 1921 their net operating income was $616,000,000, while at the rate at which they earned in the first seven months of this year it will amount in the entire year 1931 to only about $548.000,000.

Railway Net Down to That of 1902

Excepting during 1919 and 1920, when railway returns were guaranteed by the government, this would be the smallest net operating income earned since 1902, and perhaps since 1901. The foregoing figures are for Class I roads only. The net operating income of all roads in 1902 was $560,000,000 and in 1901, $511,-500,000. The investment in all railways in 1902 was about $10,700,000,000. In the Class I roads in 1921 it was $21,000,000,000, and in 1931, about $27,000,-000,000. In other words, the railroads are now earning less net operating income than in 1921, when their investment was about $6,000,000,000 less than now, or even than in 1902, when it was about $16,000,000,-000 less than it is now.

The railroad industry did not prosper from 1921 to 1929 as did most other industries, and has suffered relatively much more during the present depression than most other industries, and in consequence the prices of railroad stocks have now reached almost the lowest level in history, while the prices of industrial stocks are still almost twice as high as they were at the lowest point reached in 1921. If the railroads were allowed to prosper during periods of prosperity as most other industries are, they would not have to seek advances in rates during periods of depression as they are being forced to now.

Depreciation Accounting

The Interstate Commerce Commission has, as reported in the *Railway Age* of September 12, issued its report on depreciation accounting. The railroads, as the matter stands now, must prior to September of next year file with the Commission their recommendations regarding depreciation rates, based on estimated service life of various classes of equipment and structures. The commission will then issue temporary orders fixing definitely the percentage of the original cost of each class of property to be charged each year as depreciation to operating expenses and, beginning in 1933, the railways must inaugurate these accounts.

The railways now charge depreciation on equipment but not on most other physical property. The practice has been to meet the fact of depreciation by charging to operating expenses the original (in some cases, the replacement) cost of structures when actually retired. This practice the railways would be glad to continue. Its primary advantage for them is that it permits some averaging out of expenses over good and bad years. In years when earnings are plentiful and operating expenses can stand the burden, heavy retirements are made. Conversely, in years of very poor earnings, retirement charges are held down to the minimum. Thus the railways are able to bolster up their credit in lean years, while at the same time adequately maintaining their property by the renewals they charge in years of better earnings.

It would be interesting to know just what the rate of return on property investment would be at the present time if depreciation accounting were now in effect. It might be one per cent instead of two. Or, on the other hand, it might be nothing or less than nothing. And the list of the issues of bonds which will become illegal for saving bank investment at the end of this year would be vastly augmented.

From a purely theoretical standpoint uniform annual depreciation charges are probably justifiable. But they are with justice inapplicable to railroads unless some

measure of revenue uniformity in good and bad years can be achieved and unless the recapture clause is modified to spread over average earnings of a period of years. Commissioner Eastman, who wrote the commission's report, is long on theory and oblivious to practical difficulties which must be corrected if his decision is not to work great hardship on the carriers.

The report makes a gesture toward distinguishing between depreciation for accounting and that for fixing the rate base. Actually, however, it seems highly improbable, if this plan is made effective, that the depreciation shown in the accounts will not be seized upon and utilized to depress the rate basis. Depreciation is to be charged on original cost, not on replacement cost. This is the theory which accords to the owner of property only a right to a monetary claim in it and not to ownership of the property itself. Assume a building costing $20,000 and with a life of twenty years. The depreciation rate, according to Commissioner Eastman's theory, should be $1,000 a year, which the owner would be entitled to collect from his tenants. At the end of twenty years he would have $20,000 with which to replace his building. If, in the meantime, prices had doubled, in order actually to replace the building, this owner would have to borrow $20,000. His claim to his original monetary investment would be intact, but he would have lost one-half of his actual property.

The Supreme Court in the United Railways case appears to hold a view of depreciation widely different from that of Commissioner Eastman. Because of this and because the application of this plan promises definite harm to the railways, we hope that the decision will be carried to the courts. It must also be remembered that this case was heard by the Commission jointly with *Ex parte 91,* proposed revision of the accounting classification. If the far-reaching innovation contemplated in this decision can be taken as an indication of the general tone the railroads may expect in the decision in *Ex parte 91,* then they are facing a further danger. Prompt and vigorous action on this decision will be the best defense against further assaults in the accounting sector.

Highway Transport's Taxes, And What It Gets in Return

State Senator W. H. Vanderbilt of Rhode Island—a scion of the illustrious railroad family of that name who has forsworn its traditional interests to indulge a fancy for bus operation—is the latest highway transport oracle to let the public in on the "facts" of bus taxation. Buses, he reveals, according to the Providence Journal, are "not objects of charity." On the contrary, he continues, bus concerns pay $1.30 for every $100 of invested capital as compared with $1.50 paid by railroads.

What the Senator, like other highway transport spokesmen, fails to mention, is the fact that the bus lines do not have to invest money in, and pay taxes upon, the roadway they use. Neither do they have to maintain that roadway. Indemnify the railways for their investment in their roadway and free them of the cost of maintaining it, and then tax them $1.30 per hundred on their investment in rolling stock only—in short, treat them exactly as the bus and truck lines are treated. They could then offer transportation for both freight and passengers at such low rates that long distance bus and truck service would appear in its true comparative economic position—a luxury attractive only to spendthrifts.

This relative disparity in comparative costs of the two forms of transport, with economy strongly favoring the railroads, exists today—but that fact is concealed because railroad rates reflect total costs of sevice and highway rates only a portion of the costs. Purchasers of transport are swayed by the rates they are charged, not by the true total costs of the services they receive. There are evidences that taxpayers are awakening to the many unjust burdens they are being forced to bear. And of these burdens none is more obviously unjust than that of being forced to pay a large part of the transport bill of those individuals and firms who use long distance highway and inland waterway transportation.

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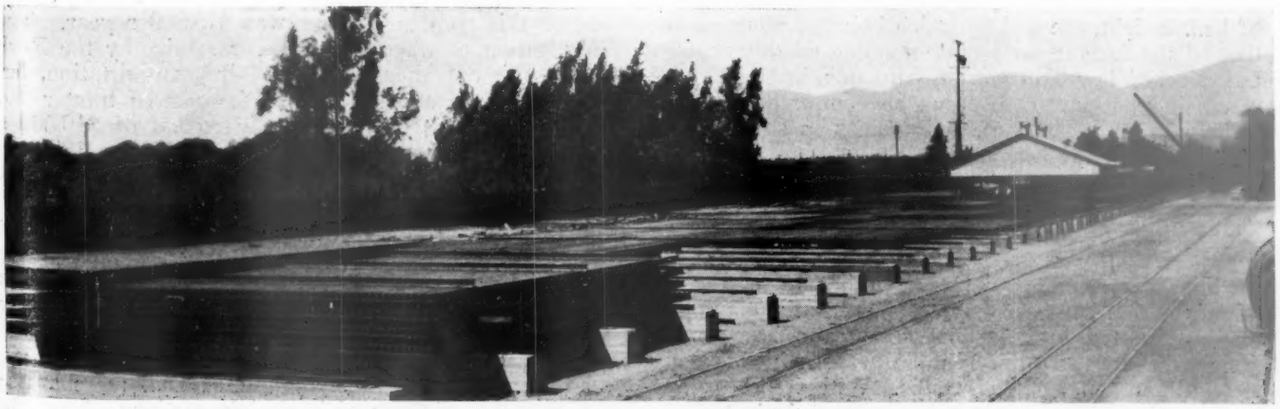


In the Rail-Handling Yard of the Santa Fe at San Bernardino, Cal.

Motor Trucks Reduce Cost of Freight Service

Economies will result from substitution of highway equipment for freight cars in handling much l. c. l. tonnage

Trucks of Medium Capacity Can Do the Work of Many Peddler Freight Trains

SUBSTANTIAL economies in the handling of l.c.l. freight can be obtained through the substitution of motor truck or tractor and trailer service for freight car transfer movements in terminals, and for short-haul freight train operation on light-traffic branch lines, and even upon main lines. The cost involved in handling l.c.l. freight has always been out of proportion to the cost of handling other kinds of freight. The reason does not lie entirely in the smallness of l.c.l. freight units; rather, it arises from the inadequate utilization of equipment, excessive switching, and frequent handlings which are a necessary part of l.c.l. freight transportation provided by railway rolling stock alone. The motor truck and the tractor and trailer offer a flexible and economical vehicle for the transportation of l.c.l. freight, the size of which is better adapted than that of the freight car to the handling of shipments of l.c.l. size. They also permit reduction in the requirements in man-power, and can save unnecessary miles of movement because of their ability to short-cut the often circuitous railway routes.

The most advantageous use of motor trucks by railways can be made in congested terminals. Here economy will result from the substitution of motor trucks for the freight cars used in trap car or ferry car service between freight stations and industries in the terminal district, between major freight stations and substations located in industrial areas, and between the freight stations of different railways which have a steady interchange of l.c.l. traffic. With respect to line-haul service, the motor truck can be substituted economically for many way-freight trains, and for trains used to transport l.c.l. freight from outlying stations to central concentration points for the loading of full cars.

Reducing Cost of Terminal Handling

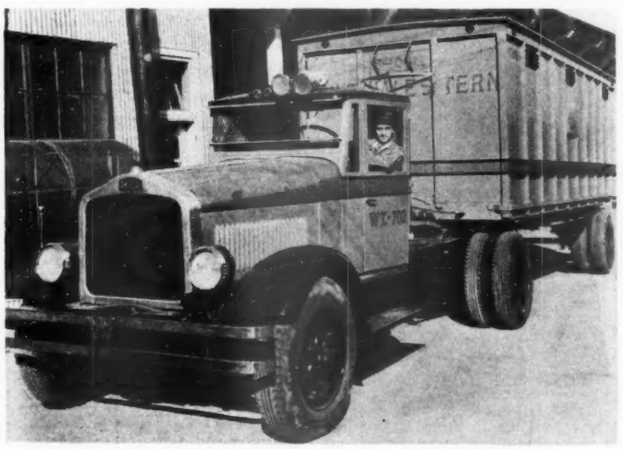
The trap car or ferry car is an expensive unit of transportation, involving as it does the occupancy of valuable track space in congested terminals, light loading, and frequently round-about switching movements. To a large extent the expense involved in the movement of l.c.l. freight by trap car can be avoided by the use, instead, of motor trucks, or tractors and trailers. For example, the Chicago, Rock Island & Pacific once operated trap cars from its Taylor Street station in downtown Chicago to Blue Island, with stops at a number of intermediate points. The average cost of carrying on this trap car service was $15,300 a year. The substitution of tractor and trailer service by the Rock Island not only has saved time in transportation, but also has saved money, because the cost of tractor and trailer service is only slightly in excess of $10,000 a year. The saving to the Rock Island from this one operation is in excess of $5,000 a year in the out-of-pocket cost of providing necessary service. In addition, the railway benefits from the release of car space at the congested Taylor Street station, and also profits from the release of the freight cars formerly used in the trap car service, which are now available for other work.

In St. Louis, Mo., the Missouri Pacific formerly operated trap cars for the handling of l.c.l. merchandise freight between three of its freight stations. The substitution of motor trucks for the trap cars not only has

eliminated a delay of 24 hours formerly incurred in the handling of the freight by trap car, but also saves 52 cents a ton, or approximately $1,000 a month. In addition there is a saving of 8 cars a day, or 214 cars a month. This motor truck substitution also has made possible the cancelling of all schedules from one of the stations, saving 275 cars, or 2,200 car days, per month, with a saving in per diem of $2,200 a month.

Motor trucks also make the rendering of l.c.l. freight service more economical by permitting the concentration at one transfer station of the l.c.l. freight received at several different stations, and the utilization for the line haul of only the minimum number of cars necessary to handle the traffic. An example of such an economical substitution of motor trucks for freight cars is found on the Long Island. Previously, l.c.l. freight enroute to different points on various lines of the railroad was loaded into freight cars at each of four freight stations in Brooklyn, N. Y., and vicinity. One tractor and six trailers were put into operation, transporting l.c.l. freight from three stations to the fourth, where shipments received at all four stations were loaded into freight cars for movement over the different lines of the railroad. As a result, one freight car now does the work formerly requiring four cars. In one month the tractor and six trailers handled 1,629 tons of freight, which would have required 300 freight cars. The saving, inclusive of per diem, is $6,647 a month, while the tractor and trailer hire is $3,855 a month, leaving a net saving of $2,860.

The New York Central and the Pennsylvania make more extensive use of motor trucks in replacement of train and freight car service than any other railroads



Tractors and Trailers Handle Heavy Loads Economically

in the United States. On the Pennsylvania, trucks, tractors and trailers are in operation in replacement of rail service at 116 terminals, the service requiring 1,432 motor trucks, 278 tractors, and 1,201 trailers. Similarly large are the motor truck, tractor and trailer requirements of the New York Central in its system-wide freight train replacement operations. An example of the saving in mileage made possible by the use of motor vehicles instead of trap cars is afforded by the situation at Buffalo, N. Y. Interchange between the stations of the New York Central and those of other railroads in Buffalo was formerly carried on by freight car and switching movements. Interchange is now effected by tractor and trailer, the distance covered by the motor vehicles in effecting the transfers being substantially less in each instance than the distance involved in the movement of freight cars between the various stations. In one instance tractors and trailers have to go only two city blocks to effect a delivery which formerly required eight miles of freight car movement.

Substitution for Way-Freight Trains

Advantageous substitution of motor trucks for way-freight trains can be carried out on heavy traffic as well as light traffic lines, whether main lines or branch lines. The savings involved are found not only in time of transportation, but substantial savings are also effected in the expenses required to provide the service. Over most, if not all, of its system of railway lines, the New York Central has found it economical to substitute motor vehicles for way-freight trains. On its branch lines between Buffalo and Niagara Falls, for example, way-freight train service has been entirely replaced by a truck, tractor and trailer operation. The Pennsylvania is operating 62 motor trucks on 49 routes aggregating 1,770 miles in length. The trucks, operating 849,690 truck miles a year, make possible the elimination of train service at an annual saving in operating expenses of $1,335,000. These truck substitutions have been found advantageous by the Pennsylvania also because they eliminate interference with through trains in areas where the traffic is dense.

The New York, New Haven & Hartford, operating 90 motor trucks through its subsidiary, the New England Transportation Company, has replaced a substantial part of its way-freight train mileage. Currently its motor truck operations are saving 6,734 train miles weekly, reducing train operating expenses by $12,120 a week. The annual saving resulting from the New Haven's substitution of motor trucks for freight trains is approximately $630,000.

To provide the necessary freight service at the lowest cost, the Central of New Jersey substituted a motor truck for train service between Red Bank, N. J., and Point Pleasant, a distance of 28½ miles. This truck service made it possible for the railway to eliminate one round trip way-freight train, operated daily between Jersey City, N. J., and Point Pleasant. To complete its run, the way-freight train consumed 11.4 hours a day, involving 3.4 hours of overtime. Although it has been necessary to operate a short-run train between Elizabethport and Matawan for carload movements, there is a net saving in this substitution of 80 train miles a day, or a saving in operating expenses of $116.68 a day. Similarly, trucks operated by the Baltimore & Ohio between Baltimore, Md., and Washington, D. C., replacing local package freight trains, have effected a reduction of $879 a month in operating expenses.

On the Central of Georgia, three motor trucks and two through trains now perform the freight service which formerly required four local freight trains between Columbus, Ga., and Birmingham, a distance of 150 miles. The two remaining trains now handle cars between concentration points from which the motor trucks operate to serve the intermediate stations. This substitution has released the equipment of two trains and has eliminated two train crews. The saving in train operating expenses is $20,000 a year and the saving in per diem is $12,000 a year.

Likewise, motor trucks, tractors and trailers on the St. Louis Southwestern have made possible the elimination of certain merchandise cars, at an annual saving of $18,978 and the elimination of freight train mileage at a yearly saving of $45,624.

The loss of l.c.l. freight traffic to competitive motor trucks has made proportionately more expensive the handling of the remaining l.c.l. freight business. It behooves the railways, therefore, to provide the necessary

transportation service for l.c.l. freight as inexpensively as possible. The experience of those roads mentioned above, and of other railways which are making use of motor trucks in connection with their freight service, indicates that the motor truck and the tractor and trailer, operated in terminal as well as line haul service, offer a means by which a less expensive, and at the same time a more attractive, service can be offered.

Under the competitive conditions now existing, savings in time in transit on l.c.l. freight are quite as important as savings in the expense involved in handling it. The motor truck is now meeting both of these requirements on a number of roads and it is capable of doing so on others. Co-ordinated with railroad train service, the motor truck and the tractor and trailer have proved themselves an economical, fast, and convenient means of providing l.c.l. freight service.

In Next Week's Issue

One of the "necessary evils" of railroad operation is the "rip" track. By the very nature of the service rendered, a high degree of systematization and mechanization is impossible. Notwithstanding this general limitation, however, there are exceptionally attractive opportunities for savings in some of the operations on repair tracks. How these savings can be effected will be set forth in the article in this series which will appear in next week's issue.

Freight Car Loading

WASHINGTON, D. C.

REVENUE freight car loading in the week ended September 12, which included the Labor Day holiday, amounted to 667,750 cars. This was a decrease of 298,063 cars as compared with the corresponding week of last year and of 485,524 cars as compared with 1929. The holiday came a week earlier in those years. All districts and all classes of commodities reported decreases as compared with 1930. The summary, as compiled by the Car Service Division of the American Railway Association, follows:

Revenue Freight Car Loading

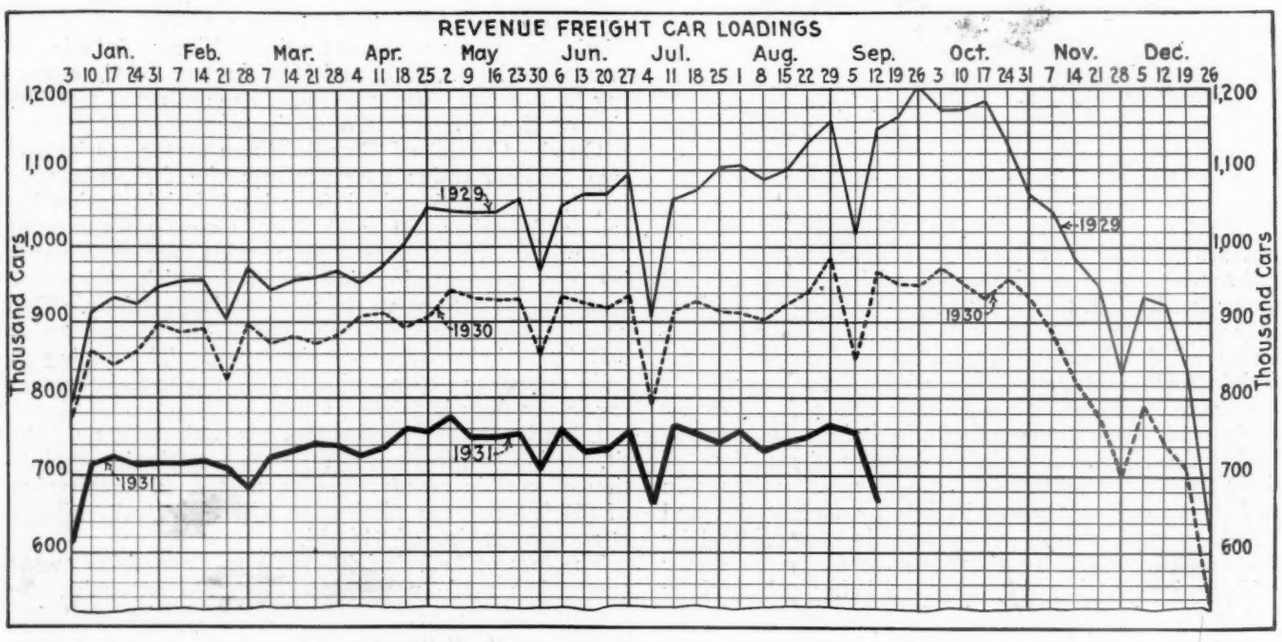
Week Ended Saturday, September 12, 1931			
Districts	1931	1930	1929
Eastern	144,398	215,881	259,385
Allegheny	132,053	194,033	234,351
Pocahontas	45,844	57,753	66,726
Southern	94,777	129,695	154,607
Northwestern	94,159	147,962	180,138
Central Western	101,293	142,585	166,453
Southwestern	55,226	77,904	91,614
Total Western Districts	250,678	368,451	438,205
Total All Roads	667,750	965,813	1,153,274
Commodities			
Grain and Grain Products	33,572	49,920	52,890
Live Stock	23,743	26,903	29,273
Coal	112,266	159,944	188,234
Coke	4,658	8,148	11,370
Forest Products	24,167	40,800	64,826
Ore	30,286	50,787	69,600
Mdse. L.C.L.	187,645	243,044	269,387
Miscellaneous	251,413	386,267	467,694
September 12	667,750	965,813	1,153,274
September 5	759,546	856,649	1,018,481
August 29	763,764	984,510	1,162,100
August 22	748,711	940,558	1,137,966
August 15	742,736	922,823	1,102,567
Cumulative total, 37 weeks	27,085,331	33,250,477	37,549,492

The freight car surplus for the week ended September 7 averaged 565,109 cars, a decrease of 8,571 cars as compared with the preceding week. The total included 297,226 box cars, 202,595 coal cars, 25,568 stock cars and 14,610 refrigerator cars.

Car Loading in Canada

Revenue car loadings at stations in Canada for the week ended September 12 totaled 50,025 cars, a decrease from the previous week of 3,179 cars and a decrease from the same week last year of 27,331 cars.

	Total Loaded	Total Cars Rec'd from Connections
Total for Canada		
September 12, 1931	50,025	20,153
September 5, 1931	53,204	23,593
August 29, 1931	49,011	22,562
September 13, 1930	77,356	30,885
Cumulative Totals for Canada		
September 12, 1931	1,782,013	963,412
September 13, 1930	2,234,675	1,242,976
September 14, 1929	2,490,053	1,526,654



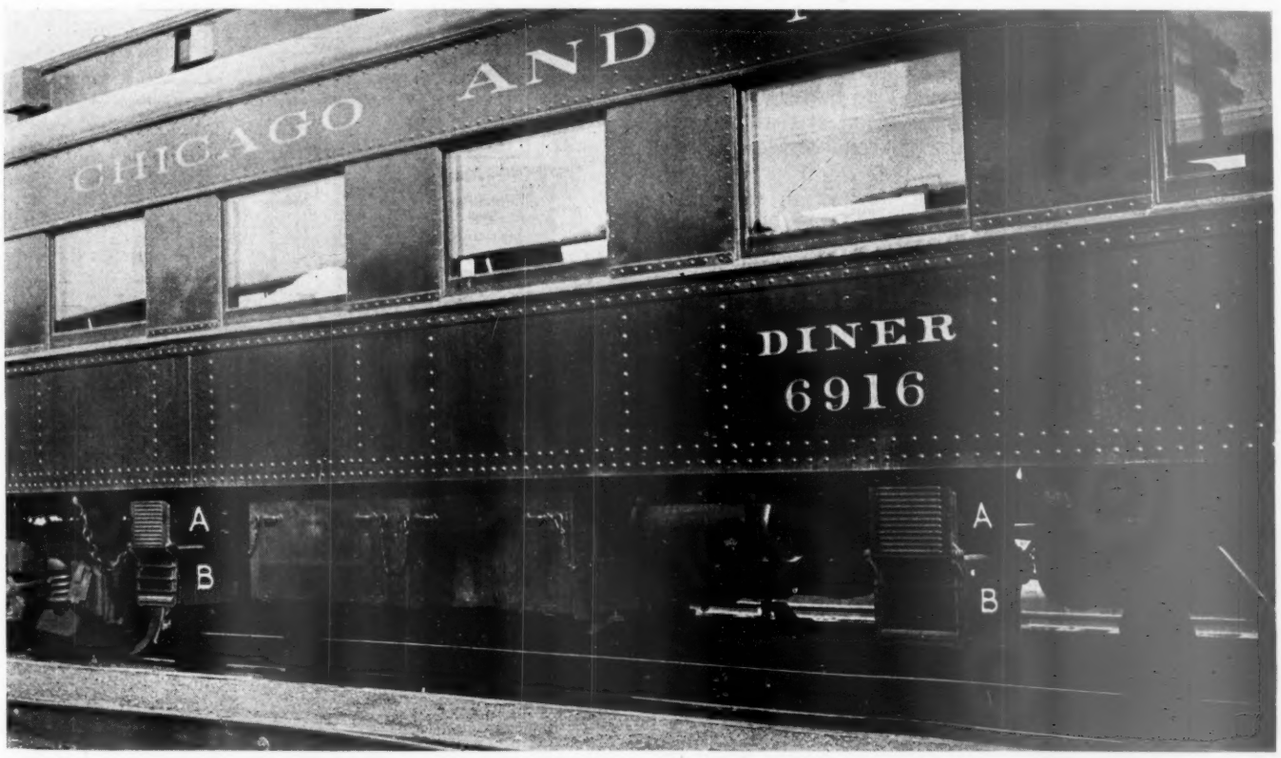
North Western Tests Unit Air-Conditioning Equipment

Successful application to diner indicates practicability of unit idea from mechanical and economy standpoints

SINCE the summer of 1930, the Chicago & North Western has been experimenting with a distinctly new type of passenger-car air-conditioning equipment, developed by the Melcher Company, 549 W. Washington boulevard, Chicago, which comprises essentially air-cleaning, cooling, heating and conditioning apparatus, arranged in a compact design readily applicable to existing car equipment in as many units as needed, dependent upon the size of the car and the cooling and heating requirements. The principal advantages of this construction, as indicated by experience on the North Western, include ease and low cost of installation, operation and maintenance; light weight; small current consumption; reliability; interchangeable, multiple air-cooling units; ready application to existing cars of all types; and high overall efficiency. The high efficiency is said to result from use of the following features of construction: Short air ducts providing minimum friction and heat loss in transit; the conditioning of air only in the zone occupied by passengers, or the space from the floor to a plane six feet above the floor; the use of small motors, rated well within the range of a battery source of power and thus assuring constant operation and uniform car temperatures; the operation of only as many units as may be required and therefore at their point of maximum efficiency; the employment of only two heat conversions, namely absorption of the heat in the conditioned air by the refrigerant and transfer of the heat in the refrigerant to the atmosphere (see schematic diagram); the compact and strategic relation of the component parts requiring but six feet of refrigerant travel.

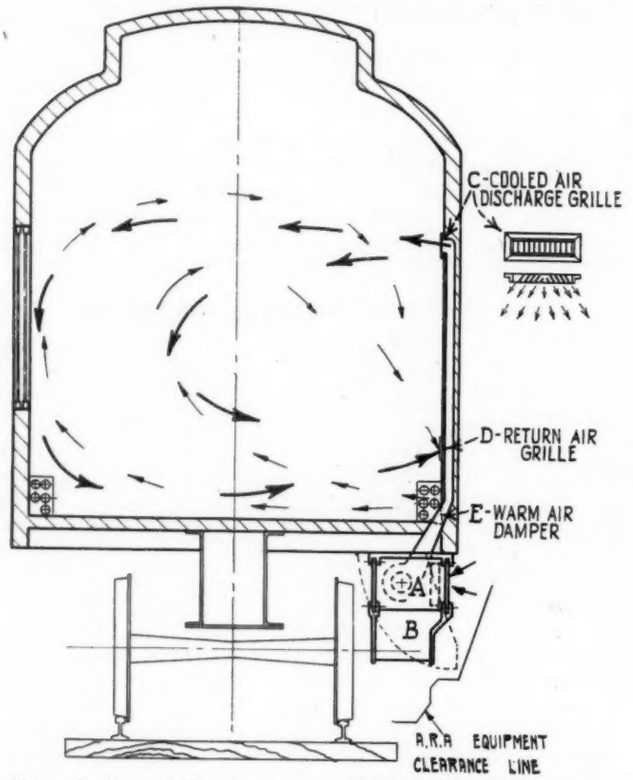
How the Air-Conditioning System Operates

The Melcher Air-Unit method of air conditioning has been in the process of development for several years, but the first practical installation in railway service was made in a Chicago & North Western suburban car in the summer of 1930. This was but a single unit in a 12-ft. compartment. In the spring of 1931, a complete installation of four units was made in a North Western diner at the Chicago shops of this road. During the past summer, this car has been in daily service between Chicago and Milwaukee on trains No. 152 and 153. This run was chosen because of its severity from an air-conditioning standpoint in that temperatures were high, traffic heavy, pre-cooling opportunities limited and non-battery-charging periods long. In spite of these adverse conditions, temperature differentials of 10 to 15 deg. F. were readily maintained on the hottest days, with the car loaded with 36 passengers and 5 attendants serving meals continuously.



Melcher Air Units as Applied to Chicago & North Western Dining Car

Chicago & North Western dining car No. 6916 is equipped with four Melcher Air Units, located two on each side of the car under the dining section, but staggered so that each provides a practically uniform distribution of conditioned air in about one-quarter of the length of the dining section. At the same time a minimum amount of undercar equipment changes is required. Power is furnished by a 5-kw. 32-volt generator and two 450-ampere-hour lead batteries, installed independently of the lighting system so that an exact check might be made of the current consumption of the Air Units.



Cross Section of Car Equipped with Air Unit—Heavy Arrows Indicate Movement of Cooled Air—Light Arrows Show Warm Air Circulation When Heating is Required

All of the usual ventilating devices in the 'ining section, such as windows, deck ventilators and intakes are kept permanently closed. Referring to the cross-section drawing, *A* is the air section and *B* the refrigerating section of the unit. Outside air is drawn into the air section *A*, cleansed by being passed through a filter, cooled in a cooling coil and discharged by the blower from the unit to a vertical duct, located between the inner and outer sheets of the car side. At a point about six feet above the floor is a discharge grille *C* so constructed as to produce a broad, flat sheet of air and distribute it over a wide area and without draft on passengers. A return air grille is located at *D*. During the heating season, a damper *E*, located in the duct just above the unit, causes the air to be discharged under the heating coils in such a manner that the air movement is said to be transmitted their full length. This tends to cause a uniform distribution of heat, adding much to the comfort of the passengers during extreme cold weather and further increasing the capacity and efficiency of the entire heating system.

The conditioned air, after being discharged into the dining section, passes through the pantry and kitchen where it is discharged from the car by a deck exhaust fan. The return air grille *D*, 8 in. by 12 in., is located about midway between the car floor and the belt rail at each unit and connected with the compartment between the inner and outer car sheets. This compartment is connected with a short duct to the unit and is used for the recirculation of the car air. The usual practice is to set the regulating damper in the unit so as to bring in about 25 per cent of the outside air and mix it with 75 per cent recirculated or car air. The outside air being forced into the dining section causes a light pressure inside which prevents any leakage of air, gas, or dust from the outside into this section. This pressure also assists in discharging the air through the kitchen, keeping kitchen odors out of the dining section as well as giving the kitchen crew the benefit of the conditioned air. When cars other than diners are equipped, the discharge may be handled at any location desired.

Temperature Records C. & N. W. Dining Car No. 6916 Equipped with Four Melcher Air Units

Train No. 152, Milwaukee to Chicago, August 8, 1931.

	Milwaukee	Racine	Kenosha	Chicago	California avenue
Outside	78	82	83	86	90
Diner	72	72	73	74	75
Parlor car	78	82	82	86	89

Train No. 153, Chicago to Milwaukee, August 8, 1931

	Chicago	Kenosha	Racine	Milwaukee
Outside	92	97	95	92
Diner *	78	85	84	82
Parlor	92	99	98	96

* Car contained 36 passengers and 5 attendants serving meals continuously during runs.

Details of the Air-Cooling Equipment

The Air Unit consists of three sections, a mounting plate, the air section and the refrigerating. The mounting plate, permanently fastened to the underframe of the car, is of a manifold design and contains ports that are permanently connected with the ducts entering the car. The ports in the plate register with the ports in the unit, and the plates and units are jig-drilled so that all units and plates interchange. For maintenance or any other purpose, any section may be readily detached

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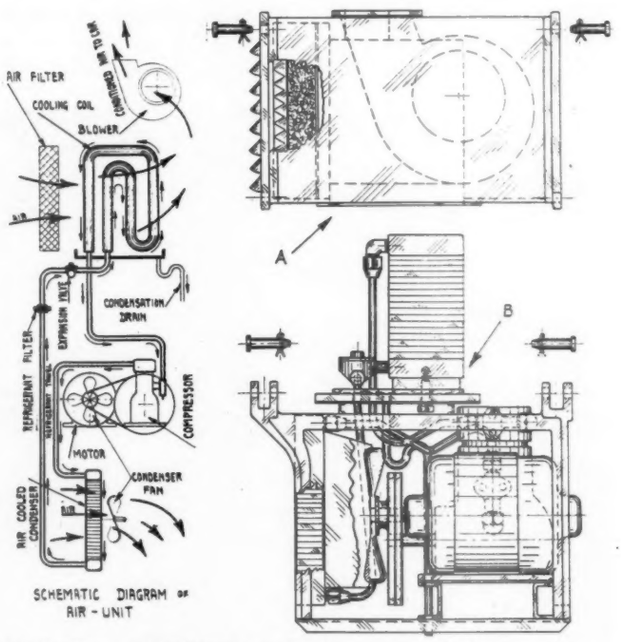
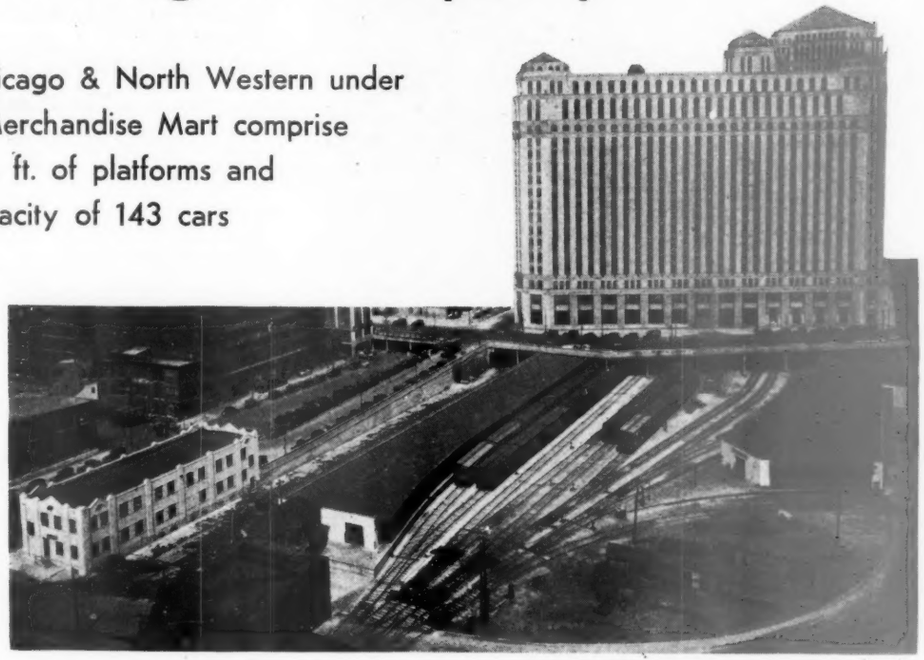


Air Section *A*, Refrigerating Section *B*, and Schematic Diagram of Melcher Air Unit

Opens Notable Freight House on Air Rights Property

Facilities of the Chicago & North Western under the Chicago Merchandise Mart comprise 2,700 lin. ft. of platforms and a capacity of 143 cars



A View of the Merchandise Mart and Freight House from the West

ON May 11 the Chicago & North Western placed in service a new freight house under the Merchandise Mart at Chicago, which latter project represents the most extensive air-rights development of railway property yet undertaken in Chicago. The Merchandise Mart is the largest building in the world measured by floor area. The main portion of the building is 18 stories in height and is surmounted by a 6-story tower. It is constructed on property formerly occupied by the North Western's old Wells Street passenger station which was abandoned in 1911 when the Madison Street passenger station was placed in service. The structure is bounded on the east by Wells street, on the west by the Franklin-Orleans viaduct, and on the north by Kinzie street, while on the south it is separated from the Chicago river by an elevated drive connecting the Wells street and the Franklin-Orleans viaducts. Including the elevated drive along the river bank, the Mart is 411 ft. deep along Wells street, and has an average length of about 620 ft. between Wells street and the Franklin-Orleans viaduct.

A Big Wholesale Center

The Mart was conceived as a wholesale mercantile center and is owned under an air-rights sale by Marshall Field & Co., which occupies part of the structure for its own wholesale business and leases space to many other firms for the same purpose. This site was deemed a particularly favorable one for such use by reason of the rail service afforded by the North Water Street line of the North Western, a two-track industrial service lead that parallels the main stem of the Chicago river from a crossing of its north branch to the shore of Lake Michigan.

This location lent itself naturally to the development of air rights primarily because of the existing complete separation of street and track grades. Both the Franklin-Orleans and Wells Street bridges over the river are carried at such elevations that their approaches are at about second floor height above the track level. The location is also a favorable one for a freight house as it is separated from the main business center or "loop" district of Chicago only by the river. Accordingly, the railroad disposed of the air rights above elevation 23 (Chicago City datum) to Marshall Field & Co., in addition to the areas below this level occupied by the building columns and their supporting caissons, various mechanical and heating facilities, 250 ft. of frontage along the river bank and the private trackage and freight-handling facilities of this company, the North Western retaining sufficient space on the lower level to accommodate the freight house.

Arrangement of the Facilities

The freight house is developed in an east and west direction, the outbound section being under the north portion of the building while the inbound section parallels the river under the south portion. This arrangement takes advantage of the greater accessibility of the north side of the building to street trucks, since the outbound facilities are designed to handle about 1,000 tons of freight a day and the inbound section only 600 tons. In the construction of the freight house no connection of any kind was provided between these facilities and the upper floors of the Merchandise Mart.

Proceeding southward from the north face of the Mart, the facilities consist of a teamway for trucks; the outbound platform; three tracks serving this platform; the two through tracks of the South Water Street line; a 72-ft. strip containing the private facili-

ties of Marshall Field & Co.; two tracks serving the inbound section; the inbound platform; and a teamway adjacent to the river. The three outbound tracks are connected at each end with the North Water Street line, while the inbound tracks and two tracks serving the Marshall Field facilities terminate a sufficient distance from the east end of the building to allow space for a driveway between the end of these facilities and the west line of the Wells Street viaduct.

General Features

Both the in and outbound platforms extend several hundred feet west of the Mart. The outbound platform has a total length of 1,450 ft., while that of the inbound platform is 1,250 ft. The three tracks serving the former will accommodate about 93 cars and those at the latter platform 50 cars. Each section of the freight house under the Merchandise Mart has two levels, the platform and a basement, the latter levels of the two sections being connected by a concrete-lined freight transfer tunnel 180 ft. long and about 8 ft. square which extends under the tracks about midway of the building.

The enclosed portion of the outbound platfrom is 60 ft. wide and has a total area of 73,250 sq. ft. of floor space, which includes that of the extension platforms. The loading platform on the track side is 6 ft. wide, and, in addition, a transfer platform is provided between the first and second tracks, which is made necessary by reason of wide track centers caused by the existence of a row of columns between the tracks.

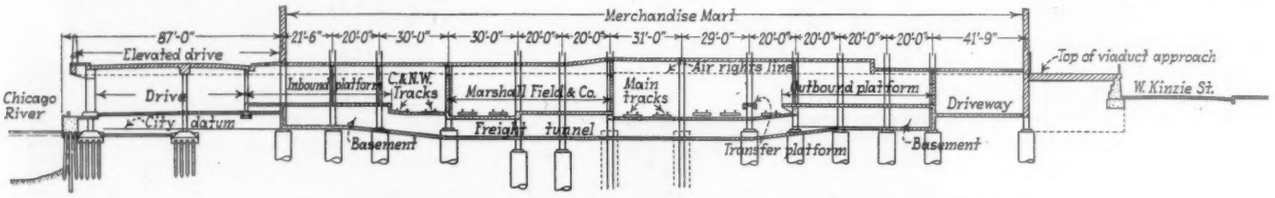
The inbound platform varies in width from 45 to 58 ft. and has a total floor area of 61,200 sq. ft., 7,200 sq. ft. of which is occupied by two adjoining cold rooms for the storage of perishables. The unloading platform on the track side is 4 ft. wide. The usual checkers' houses, foremen's offices and weighing scales are provided on both platforms.

The platform level of each section of the freight house is connected by an elevator with the underground railway system of the Chicago Tunnel Company. This system has a track gage of 24 in. and operates cars 12 ft. long. Sufficient trackage of this gage to accommodate about 60 tunnel cars is constructed on each platform. Each main platform of the freight house is also connected to the basement level by two freight elevators, one near each end of the platform. These elevators have a capacity of 10,000 lb. each.

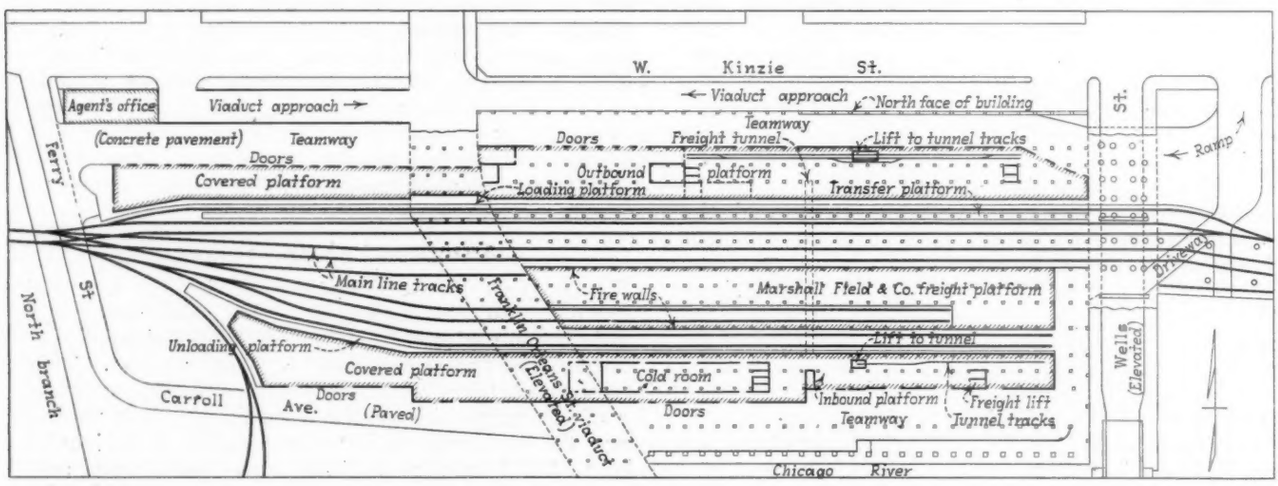
The Basement Facilities

The basement of the outbound platform is 60 ft. wide and about 450 ft. long and, with the exception of the space taken up by a fan room, the locker room and the elevator shafts, the entire floor area of this basement is available for the storage of freight. The lower level under the inbound platform is 538 ft. long and has a maximum width of 46 ft. For 179 ft. from the west end, the full width of this basement is occupied by a cold room, which is served by an elevator at its east end. The remaining facilities on this floor are similar to those found in the out basement, with the addition of a refrigerating plant and two fan rooms, one for drawing exhaust gases from each of the teamways.

The platforms are paved with 2-in. and the drives with 3-in. wood blocks on concrete base. Flooring in the basements consists of 1½-in. mastic on a 9-in. concrete base and all walls are of brick. Exposed surfaces of concrete, such as columns, beams and ceilings, are sprayed with a portland cement paint. The team sides of the platforms are equipped with Truscon vertical chain lift sectional doors, there being 35 of these doors on the outbound platform and 16 on the inbound platforms, including the extensions. Freight is loaded directly through these doors to or from the trucks. The track sides of the platforms are provided with Truscon sliding doors.



A Cross Section of the Facilities Through the Freight Transfer Tunnel



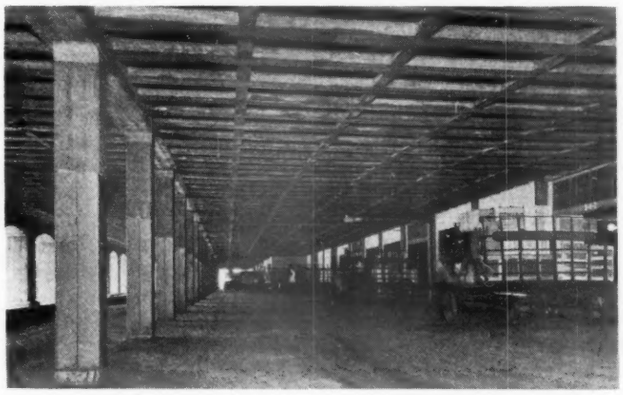
Plan of the Freight House

With the exception of the extension platforms, which are in the open air, the team sides of the platforms are provided with exhaust intakes for drawing off combustion gases discharged from motor trucks. These gases are conducted through a system of concrete ducts to a common outlet on the south side of the structure.

Extension Platforms

In the design of that part of the platforms extending westward beyond the confines of the Merchandise Mart, it was borne in mind that this area also holds possibilities for the future development of air rights. For this reason, these platforms, although adequately substantial for the purpose, are constructed along lines that will enable them to be dismantled or reconstructed at a minimum cost. They are constructed of steel, concrete and brick and have flat roof decks of pressed steel covered with a waterproofing membrane, which are also extended to provide canopies over the unloading platforms on the track sides.

As in the case of the main platforms, the extensions are floored with 2-in wood blocks on a concrete base, with the exception of the track side unloading platforms which are floored with concrete. The edges of these platforms are provided with a rabbet for supporting the sides of container cars, but until these cars are brought



Looking West Along the South Teamway

into use extensively the rabbets will remain filled with concrete. Both extension platforms are somewhat irregular in shape. The inbound extension is about 400 ft. long, while the outbound extension is about 550 ft. in length.

Ventilating Facilities

The larger of the three fan rooms in the basement under the inbound platform draws air from the outbound teamway through a second concrete tunnel under the tracks. A New York Blower fan powered with a 60-hp. General Electric motor is installed in this room and pulls the air through a grate in the floor. The fan room for exhausting air from the inbound drive is somewhat smaller and houses equipment of the same make but of less capacity, the fan being powered with a 25-hp. motor.

A noteworthy feature of this project is the fact that fresh air for the platforms and offices of both sections is supplied from the tunnels of the Chicago Tunnel Company, which are at a depth of about 70 ft. below the ground level. Equipment for filtering, heating and distributing this air is housed in the fan room in the outbound basement and the third fan room in the inbound basement. This equipment includes New York Blower fans, oil filters for cleansing and purifying the

On One of the Extension Platforms

air and steam heating coils. Steam for heating the entire freight house, including the offices which are housed in a separate building, is furnished by the heating plant of the Merchandise Mart.

A Larson-Baker ice machine, in which the ammonia compressor is powered by two Westinghouse alternating current motors of 440 volts each, is housed in the refrigeration machine room in the inbound basement. A brine storage tank of 8,000-gal. capacity is also located in this room. This equipment maintains the cold rooms at a temperature of 40 deg. F., and in addition each is supplied with a Moore humidifier for supplying fresh air and for maintaining the atmosphere at a constant humidity.

Layout of Drives and Teamways

The area containing these facilities is completely encircled by driveways in such a manner that access to each section of the freight house is afforded from either direction. Entrance from the east is by means of a ramp from a point on Kinzie street about 100 ft. east of Wells street. The main stem of this entrance has a descending grade of 5 per cent. It curves sharply to the west, crosses under Wells street parallel with Kinzie street and merges with the teamway serving the outbound platform. A narrower branch of this drive crosses the outbound and through tracks at grade, proceeds under Wells street, and connects with the drive-

(Continued on page 478)

In One of the Cold Rooms on the Inbound Platform

Hearings on Railroad Practices

Testimony of New England roads concluded September 18 at Boston—New York sessions opened September 22

HEARINGS in connection with the Interstate Commerce Commission's investigation of railway practices affecting operating revenues and expenses (Ex Parte 104) were resumed in New York on September 22. The present series, which opened in Boston, Mass., on September 15 and continued in that city during the three subsequent days of last week, are under Part 2 of the general investigation, and thus relate to the terminal services of Class I railroads. W. P. Bartel, director of the Interstate Commerce Commission's bureau of service, is presiding; he is being assisted by Examiner C. W. Bardwell while the examination of witnesses is being conducted by I.C.C. attorneys A. G. Hagerty and R. W. Gwynn.

Opening testimony at the Boston sessions was reported in the *Railway Age* of September 19, on page 446. Remaining carriers heard in that city were: The Rutland, the Maine Central, the Portland Terminal and the New York, New Haven & Hartford.

Rutland

B. Bigelow, assistant general freight agent of the Rutland, opened that road's presentation with a description of two small lines connecting with the Rutland—the Clarendon & Pittsford and the Norwood & St. Lawrence—about which the I.C.C. had specifically requested information. These two lines, Mr. Bigelow explained, are common carriers with which the Rutland maintains a regular interchange and he introduced tariffs showing the Rutland's rate relationship with the short lines.

The Clarendon & Pittsford, it was developed, is a subsidiary of the Vermont Marble Company, although it has its own right-of-way, most of which is not adjacent to the Marble Company's property. In addition to its connection with the Rutland the Clarendon & Pittsford also has a connection with the Delaware & Hudson, Mr. Bigelow stated, and the rate divisions with it, originally forced by competition, have been in effect for years and were approved by the Director General during federal control. As to the Norwood & St. Lawrence, Mr. Bigelow testified that this line serves principally a plant of the St. Regis Paper Company and its traffic manager is also traffic manager of the St. Regis Paper Company.

In his general discussion of accessorial services on the Rutland the witness stated that cars are spotted under the line-haul rates at all industries except one at Bennington, Vt., where a switching charge of $1.35 a car is made. L. E. Lockerby, trainmaster, later outlined the reasons for this charge at Bennington by explaining that delivery to the plant involved required a switching movement over three streets, each of which had to be flagged.

In closing Mr. Bigelow made the general statement that no Rutland industries or shippers receive any allowances, that the road absorbs Clarendon & Pittsford switching charges and that its tariffs cover all of its storage, reconsignment and other terminal services. Mr. Lockerby's testimony, referred to above, and a brief statement by J. M. Spafford, car accountant, on per diem arrangements with the Clarendon & Pittsford and the Norwood & St. Lawrence concluded the Rutland evidence.

Maine Central

Lucien Snow, freight traffic manager of the Maine Central, appeared first for that road and in his opening statement said that the Maine Central makes no allowances to any industry for switching; neither does any industry on the Maine Central perform its own switching. Line-haul rates, he continued, contemplate the spotting of cars except in two cases. One of these latter is at Bath, Me., where a charge of $3 a car is made and the other is at Bangor, Me., where a charge of $1.50 a car over the line-haul rate is made for switching moves beyond a designated point.

On import wood pulp, Mr. Snow stated, a charge of 50 cents a ton is published for handling from ship's tackle to car; this 50 cents is absorbed by the Maine Central out of its line-haul rate subject to net minimum line-haul earnings of eight cents per 100 lb. The witness also said that the Maine Central makes the "usual competitive absorption" of all connecting line switching charges on competitive traffic.

Director Bartel was here particularly interested in the situation with reference to storage in cars of import china clay. The witness quoted the rates on this china clay storage as: Five days free, 10 days for one cent per 100 lb. and each succeeding 10 days for one-half cent per 100 lb. The Director's calculation from these rates, was that a carload of china clay would bring about 40 or 50 cents a day in revenue from storage. This he set against the $1 a day which a car would bring or would cost under per diem rules and brought out further that china clay shippers require the very best and cleanest box cars available. Continuing, Director Bartel said he had heard that china clay had remained in storage in cars for as long as two years at Philadelphia—not a few cars, he added, but several hundred. Yet, he continued, the carriers did not bring this storage situation to the attention of the Commission in the recent case wherein import china clay rates were ordered reduced. One railroad, the director was informed, lost $86 on every car of this import china clay which it handled.

Competition Brings Loss on Business

Mr. Snow readily agreed with Director Bartel that the import china clay situation had reached the point where all carriers are forced to take business at a loss. The witness was not satisfied with the rates for storage of import china clay in cars at Portland but he said that Norfolk, Philadelphia and Baltimore were doing it. He would like to get out from under the storage charge, he added, but he didn't want to lose the traffic since it was a question whether the losses on some cars are sufficient to offset the revenue on other cars which move quickly without any storage in cars at the waterfront.

Mr. Snow later explained that the Maine Central does not absorb a stevedoring charge on import china clay—it has added 37 cents a ton to its old local rate

to cover the transfer from ship to car. The upshot of the foregoing China clay discussion was a request from Director Bartel that the Maine Central file a statement setting forth for a twelve-month period the situation with reference to storage in cars of china clay at Portland. This statement is to show the average length of time these cars are held and the maximum time any car was held. The Director subsequently required from the Boston & Maine a similar statement as to its import china clay traffic through Boston.

The Maine Central, Mr. Snow also revealed, loads carload traffic of canned sea food at Eastport, Me. Traffic from this point, he continued, gives the Maine Central a longer haul than does that from any other point on its lines while at the same time the railroad encounters at Eastport the competition of two coastwise boat lines. This water competition has forced the exception with reference to the loading of carload freight. This road has potato warehouses which it serves by its own tracks, the "preferential use" of which is given the potato shippers. The status of these "preferential use" tracks was outlined in full in last week's report of the Bangor & Aroostook testimony.

Remaining Maine Central testimony was given by operating department witnesses who explained the exact switching moves involved in performing spotting service at plants about which the I.C.C. had inquired.

Portland Terminal

Charles H. Priest, superintendent of the Portland Terminal Company, explained that this property, owned 100 per cent by the Maine Central, is operated for the benefit of itself and its two tenant carriers—the Maine Central and the Boston & Maine. It has passenger, freight and waterfront facilities at Portland and also serves five stations on its lines in the terminal area. In addition to the two tenant roads, the Portland Terminal has a connection with the Canadian National. Mr. Priest was asked by Attorney Hagerty to describe several spotting services which would be typical of such operations on the Terminal in general. The Portland Terminal publishes its own tariffs including line-haul as well as switching charges.

B. & M. Interest in Mystic Terminal

W. A. Cole, general attorney of the Boston & Maine, at this point made a statement which had been requested on the B. & M.'s relations with the Mystic Terminal Company at Boston. The B. & M., Mr. Cole said, owns the entire capital stock of the Mystic Terminal, amounting to $5,000; it leases the waterfront properties to the Mystic Terminal and receives as rental any profit made by the latter. The accounts in this connection, Mr. Cole later explained, are handled in accordance with a ruling of the I.C.C. bureau of accounts.

Because a representative of independent trucking interests had referred to the B. & M. highway subsidiary, the Boston & Maine Transportation Company, Mr. Cole continued his statement to discuss the latter. He said that the Boston & Maine Transportation Company performs much service in lieu of discontinued train service. Revenue in these instances goes to the parent railroad which pays the highway subsidiary certain contract rates. In this way, Mr. Cole explained, the losses as against steam train operation are minimized.

New Haven

Testimony of witnesses for the New Haven, the final road to be heard at Boston, consumed the entire session of September 18. Two representatives appeared—H. A. Poveleite, assistant to general traffic manager, and A. H. Fairfield, special assistant to vice-president.

Mr. Poveleite first introduced New Haven tariffs providing for such accessorial services as the road performs. He stated at the outset that it has no tariff applicable to storage of freight in cars and that line-haul rates contemplate the spotting of cars at industries and public team tracks. The New Haven at several important stations provides crane facilities and its employees will aid in the loading and unloading of such traffic at a specified charge which at Boston is 50 cents a ton. This 50 cents is absorbed by the New Haven with respect to traffic on which it receives the long haul.

Crane Facilities

Director Bartel went into this crane situation in detail and brought out that no charge is made for the use of the crane proper. Mr. Poveleite would not agree, however, that this latter feature made the New Haven a loader and unloader of crane-handled traffic. The witness rather preferred to regard the crane as akin to public delivery tracks. In response to a question from New Haven counsel he stated that the cost of crane facilities would be part of the record in any case involving rates on commodities requiring crane handling. Director Bartel stated, however, that he was "not so sure" such evidence would be introduced and in this connection reminded the witness of the railway's failure to bring the import China clay storage situation into the rate case involving that commodity.

The New Haven, Mr. Poveleite next revealed, makes no charge for a back haul of perishables under its reconsignment tariffs. This, he added, was to prevent Boston from becoming a stub-end market. A reconsignment charge of $6.30 is made in each instance but this is for work incident to reconsignment only. Mr. Poveleite later testified that the New Haven does not provide for the absorption of any connecting line diversion or reconsignment charges nor does it make any allowances to shippers for switching carload freight.

Johnston B. Campbell, former Interstate Commerce Commissioner, representing the Boston Port Authority, questioned the witness with reference to New Haven tariffs on export and import freight. Mr. Campbell also suggested that it might be well to develop information with reference to leases of carrier property held by carloading companies and freight consolidators —whether rentals under such leases are nominal or are based on the commercial value of properties involved. Director Bartel did not, however, think that such data were within the scope of the present hearing.

Counsel for motor truck interests questioned Mr. Poveleite as to the New Haven's ferry car tariffs which, like those of the Boston & Maine, reserve to the railroad the right to truck freight shipped thereunder. The questioner was particularly interested in whether or not in trucking in lieu of operating ferry cars the New Haven trucks would call more than once at an industry, picking up in each case less than the 4,000-lb. minimum. The witness did not know what practice truck operating convenience dictated but he was sure that the minimum of freight had to be tendered to the railroad in one day if the ferry car tariffs were to apply. He had no information as to the cost of trucking in lieu of ferry car service.

Mr. Fairfield, the New Haven's operating witness, presented the final testimony of the Boston hearings. He explained in detail the switching moves involved in the spotting of cars at the specific plants about which

the Commission's notice to the New Haven had inquired. He also made a statement for the New York Connecting, which he described as merely a part of the Hell Gate route; it has neither side tracks nor bulk delivery tracks.

Delaware & Hudson

The Delaware & Hudson was the first road to be heard at New York and the direct testimony and cross-examination of its two witnesses consumed the whole of the September 22 session. J. K. McNeillie, superintendent on the staff of the general manager, presented a comprehensive picture of the D. & H. in his opening statement. Exhibits introduced in connection with his testimony included a map of the road showing its various connections and a condensed profile of its lines. He continued to a classification of the siding facilities or industrial tracks which the D. & H. serves. These he grouped as follows: (a) Industrial common carriers; (b) industries having a system of tracks on which they do their own switching after receiving cars from the railroad on a designated interchange track; (c) industries having a system of tracks on which the D. & H. does the spotting at several locations; (d) all other private sidings and (e) public team tracks.

With the foregoing classification in mind, Mr. McNeillie continued to outline in detail the switching moves involved in serving a typical plant falling in each class. Any switching move after the first spotting, he said, is done at a charge. With reference to coal the witness outlined in general facilities and services necessary to handle this business which he characterized as traffic requiring specialized transportation.

Considerable argument among counsel ensued when Attorney Hagerty asked Mr. McNeillie if it would be equitable for the railroad to receive additional revenue in cases where it was required to do spotting in several locations on systems of plant tracks. The witness hesitated to express an opinion and, meanwhile the arguments of counsel on the point continuing, Director Bartel ruled that the record had become adequate to speak for itself on the matter at issue.

The second and final Delaware & Hudson witness—M. V. Beckstedt, general freight agent—stated that all D. & H. terminal and accessorial charges are included in one tariff which he cited for the record. In general, he continued, the D. & H. absorbs connecting line switching charges when such charges are published and the traffic is competitive. The D. & H. participates in the published rates of the Clarendon & Pittsford, the line serving in the main the facilities of the Vermont Marble Company, and referred to in the Rutland testimony at Boston. Such participation is not the case, the witness stated, with reference to another short-line connection—the Lake Champlain & Moriah. Neither does the D. & H. make any allowance to the Lake Champlain & Moriah nor to any industry which does its own switching.

Asked if he thought there should be a higher rate for plants which required spotting at several locations, Mr. Beckstedt replied that such a situation should enter the calculation of a line-haul rate but he did not think an additional charge should be published. Remaining questioning of Mr. Beckstedt was conducted by Mr. Campbell of the Boston Port Authority and related to ship-to-car transfer charges at Albany, N. Y.

Delaware, Lackawanna & Western

The Delaware, Lackawanna & Western first presented M. Williams, general freight agent, who read into the record references to D. L. & W. tariffs covering terminal and accessorial services and then relinquished the stand to his operating department colleague, E. B. Moffatt, general superintendent. Mr. Moffatt proceeded to read a statement describing the different types of industrial tracks which are served by the D. L. & W. This classification was substantially the same as that introduced by the Delaware & Hudson and reported above, except in one respect. It included a group of industries having a system of plant tracks for the switching of which the D. L. & W. makes such industries allowances out of its line-haul rates; the D. L. & W. is the first railroad to appear thus far whose tariffs make provisions for such allowances. The allowances, which are confined to steel plants, range from 61 cents to $1.10 a loaded car.

Much of the morning session on September 23 was taken up in the questioning of Mr. Moffatt about these allowances. The witness could not explain the reason for the allowances but Lackawanna counsel stated that in some cases the allowances were ordered by the Interstate Commerce Commission and, these having been ordered, others followed in order to adjust the competitive situation as between the steel plants involved. Director Bartel brought out in this connection that the I.C.C. simply made a Section 3 finding and required that discriminations be removed but did not prescribe the manner of its removal. Mr. Moffatt informed Director Bartel that the D. L. & W. would not want to perform the spotting at these steel plants for relief from the payment of the allowances, i.e., under the line-haul rates.

At this point Attorney Hagerty attempted to obtain the witness' opinion, as an operating expert, as to when, in specific cases which the attorney cited, the railroad had completed its obligation of delivery. This question precipitated considerable argument among participating counsel who objected to the line of examination on the ground that the witness was being asked to pass upon a point of law. A remark of one of the industrial counsel that the hearings should go along in the development of the facts, without any attempt to build a record on the basis of preconceived notions, was immediately challenged by Mr. Hagerty. The latter stated that the inquiry was being conducted not on the basis of any issues but to inform the I.C.C. and thus aid it in the performance of its duty to see that the carriers are honestly, efficiently and economically operated. If unlawful practices came to light, he continued, it will of course become the duty of the commission to enter appropriate orders but the investigation is not a search for unlawful practices—it is a quest for helpful information.

After brief further questioning the examination of Mr. Moffatt was concluded and Mr. Williams reappeared for cross examination on the testimony he had introduced at the outset of the D. L. & W. presentation. Mr. Williams, in commenting upon the divisions of through rates allowed to industrial common carriers connecting with the Lackawanna, stated that competition between producing areas and between railroads had originally forced these arrangements several years ago. He did not know what the aggregate of these divisions and allowances to industries which do their own switching would amount to in one year, but Lackawanna counsel agreed to produce an accounting department witness who might be able to answer these questions.

Director Bartel was interested in what, in Mr. Williams' opinion, constituted a discharge of the carrier's

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Thomas H. Symington Dies

Well-known railway supply company executive and mechanical engineer was also prominent in research work on various aspects of freight car design

THOMAS H. SYMINGTON, of Baltimore, Md., well-known mechanical engineer; founder of the railway supply firm, the T. H. Symington Company, and, at the time of his death, chairman of T. H. Symington & Son, Inc., died suddenly on Saturday, September 19, at the Hospital for the Ruptured and Crippled in New York. He was visiting New York to attend the international polo matches. In addition to his record as a capable executive in the railway supply field, Mr. Symington was distinguished for his thorough research into railway mechanical problems, particularly those involved in the construction, operation and maintenance of freight cars.

Thomas H. Symington

Throughout his entire business career Mr. Symington dealt actively with problems pertaining to railway motive power and rolling stock both as a railway man and as a railway supply man. From the outset of his career it was evident that he possessed unusual energy and administrative capacity. In five years after his graduation from Lehigh University, where he completed a four years' course in two years, he had become shop superintendent of the Richmond Locomotive Works and was appointed superintendent motive power of the Atlantic Coast Line before he was 30 years old.

Mr. Symington was best known in the railroad field from his association with the T. H. Symington Company, of which he was the founder, and of which he was at one time chairman of the board. During the years of his executive responsibility he never lost interest in the engineering problems of his field, particularly those pertaining to railway rolling stock. In his approach to these problems he was not satisfied with opinions based on general observation and experience only, but always sought facts, quantitatively determined by the most accurate methods available—many of which he devised himself—as the basis for further procedure.

During the war years while he was actively engaged in the conduct of munitions manufacture, he conceived and was responsible for the development of the ingenious draft-gear testing equipment on which the United States Railroad Administration draft-gear tests were conducted. He also originated and carried to completion the research on cast-steel truck side frames, which was an invaluable contribution to the development of modern truck side frames.

Later on he became interested in the study of the action of freight car trucks in service, and spent several years in the development of special test equipment by which the action of the various parts of the truck with respect to each other and the car body could be accurately measured and recorded under actual service conditions. He was still engaged in this research at the time of his death.

The fund of accurate data which he was responsible for developing has already begun to influence truck design and has demonstrated both the need and the value of engineering research in the solution of mechanical problems with which the railroads are confronted.

Thomas H. Symington was born at Baltimore, Md., on May 14, 1869, and received his early education in the public schools of that city. He entered railroad service in 1887, with the Baltimore & Ohio, serving for four years as a machinist's apprentice in that company's shops. In 1891, after finishing night courses at the Mechanics Institute, he entered Lehigh University, at Bethlehem, Pa., where he completed a four-year course in two years, and also took an active part in athletics and other college activities. Upon being graduated from Lehigh in 1893, with a degree in mechanical engineering, Mr. Symington entered the employ of the Richmond Locomotive Works, where he was promoted through various positions from draftsman to that of superintendent of shops. In 1898 he severed his connection with the Richmond Locomotive Works to become superintendent of motive power of the Atlantic Coast Line, which position he held until 1901.

Since that year, when he gave up actual railway work to organize his own manufacturing concern, Mr. Symington had been prominent in the railway supply field, serving first as president and later as chairman of the T. H. Symington Company, founded by him in 1901 and incorporated in 1906. When, however, that company was succeeded by the present Symington Company, in December, 1924, Mr. Symington disposed of his interests therein, and subsequently organized the firm of T. H. Symington & Son, Inc., with offices at Baltimore. His work with the latter company, of which he was chairman at the time of his death, consisted largely of research work on cast-steel truck side frames for freight

cars and freight car dynamics in general. As a result of his research work, Mr. Symington developed a number of inventions of his own. He was also the author of several papers on freight car performance presented before the American Society of Mechanical Engineers and other railroad and engineering societies, and published from time to time in *Railway Age*.

During the war Mr. Symington owned and operated six large companies in Rochester, N. Y., and Chicago, for the production of war material, including special machinery, forgings, ordnance and artillery ammunition. Toward the close of the war, he was appointed chief of ordnance in charge of the entire United States artillery ammunition program.

Opens Notable Freight House on Air Rights Property

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way under the east end of the building, which leads to the inbound drive flanking the river.

From the west, access to the teamway abutting the outboard platform is gained directly from the street level at the northwest corner of the Mart. Entrance to the inbound side, however, is from a point on Kinzie street about two blocks west of the Franklin-Orleans viaduct. This drive occupies Ferry street and Carroll avenue and crosses the tracks of the South Water Street line west of the freight house connections before swinging east to enter the freight house. Access to the inbound drive from the Franklin-Orleans viaduct is greatly facilitated by a ramp which descends from this level to Ferry street from a point near the northwest corner of the building. Otherwise it would be necessary for trucks to descend to the lower level by a much more circuitous route.

The private freight handling facilities of Marshall Field & Co., are enclosed in fireproof walls and are not connected in any way with the facilities of the North Western. A platform extending nearly the full length of the Mart is provided in this enclosure and is served by two tracks. This section is connected to the upper floors of the Mart by elevators which constitute the only means of communication between the track and upper levels. An entrance for trucks is provided at the east end of the private facilities.

The administrative and clerical offices of the freight terminal are housed in a brick structure situated on the corner of Kinzie and Ferry streets. This building has two stories and a basement.

The foregoing work was carried on under the general supervision of the late W. J. Towne, chief engineer of the North Western, until his death, at which time it was taken up by C. T. Dike, successor to Mr. Towne. The facilities under the Mart were constructed under contract by the John Griffiths & Son Construction Co., Chicago, which firm also held the general contract for the construction of the Merchandise Mart. The contract for the extension platforms, as well as for the construction of the offices, was held by the Adams Construction Company, Chicago. With the exception of the extension platforms, which were designed under the direction of L. C. Winkelhaus, assistant engineer of the North Western, the entire project was designed by the firm of Graham, Anderson, Probst & White, architects at Chicago.

North Western Tests Unit Air-Conditioning Equipment

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from the other or from the car, by a quickly detachable but secure connection and the unit replaced or exchanged in a few minutes. Such arrangement eliminates detaining or tying up the car for any maintenance work. The multi-units provide further a protection against complete car failure. Half of the units provided in any one car will carry on the conditioning in a satisfactory manner.

The air section *A* consists of a cast-steel frame, to which is attached a heavy steel enclosure that is lined with one inch of cork. Into this is assembled a moistureproof metal liner and blower housing. The blower is equipped with a ⅛-hp. 32-volt ball-bearing motor, fully enclosed. The air filter is located in the front of the air section and is easily removable for cleaning. The normal cleaning period is every 200 hours of service. The procedure is to flush with hot water and dip in odorless light oil.

The refrigerating section *B* consists of a cast-steel frame with a removable sheet-steel enclosure. Into this is mounted a two-cylinder, fully-enclosed compressor, driven by a ½-hp., ball-bearing, fully-enclosed, 32-volt, 1,725-r.p.m., heavy-duty motor, through a double V-belt drive. On the front of the section is located a welded radiator-type condenser through which air is drawn by a four-blade fan mounted on the end of the compressor motor shaft. The air from this fan not only cools the condenser but the motor and compressor as well. On top of the section is located the radiator-type triple-section cooling coil or evaporator, which fits into an air chamber in section *A* when the unit is assembled. Directly attached is an automatic expansion valve. All coils, piping, fittings and parts that contain the refrigerant are tested at three times their maximum working pressure. The system contains three pounds of methyl-chloride refrigerating gas, which is odorless and harmless.

The cooling oil is mounted in a drain pan where the moisture extracted from the conditioned air, when lowering the humidity, is collected. From the pan, the moisture drains to the ground. All of the component parts of the cooling section are so arranged that they are a part of the cooling section only. If desired, the section may be removed quickly by quickly-detachable supporting connections and by disconnecting the two motor lead wires from the terminal block. If desired, this permits the ready removal of the cooling section during winter months.

The weight of the air section is 100 lb., the cooling section 200 lb., the mounting plate 40 lb., or a total of 340 lb. per unit. The complete unit is 29¼ in. high, 23 in. long and 24 in. wide. The unit has been designed on a basis of requiring maintenance such as lubrication, belt adjustment and motor inspection but once each year. The current consumption of the air section is 3 amp.; the cooling section, 15 to 18 amp. On a four-hour run, four units consumed 320 ampere-hours. At the present time, the Chicago & North Western dining car units operate 8 hours per day. Only three hours of this time current is furnished by axle generators. This service requires additional charge at the terminal which normal service would not require. It will be noted that the combined capacity of all motors on this car is 2½ hp.

Rate Arguments Before I. C. C.

WASHINGTON, D. C.

PROCEEDINGS before the Interstate Commerce Commission on the railways' application for a 15 per cent increase in freight rates reached the final stage this week when oral arguments were begun on September 21 before the full membership of the commission and a committee of state commissioners. This followed a series of hearings conducted by five commissioners at nine different cities throughout the country, which amounted to a total of 60 days and at which over 11,000 pages of testimony were taken. Over 130 printed briefs were also filed. The commission made public an assignment of time for argument to 72 persons, in addition to the railway counsel. Although the aggregate time exceeded a week the commission announced that it was hoped the argument would be concluded by Saturday evening, and there are some expectations that it may be able to render its decision some time in October. The time allotments included a full day for the railroads and 3½ hours for counsel representing security-holders, while a total of seven hours was allowed for the state commissions, five hours for various agricultural interests, three hours for coal dealers and operators and two for lumber interests, in addition to allotments ranging from 10 to 60 minutes for various individual companies or industries. Senator Brookhart was allowed 30 minutes and Noah W. Cooper, of Nashville, Tenn., was allotted five minutes to argue that the troubles of the roads arise from the fact that they operate on Sundays.

A general brief on behalf of the railways as a whole had been filed in the names of special committees of counsel for the eastern, southern and western groups and the western roads had also filed a special brief and another replying to criticisms by certain state commissions that they were maintaining too extravagant passenger service.

In both briefs the railways based their case squarely on their rights under Section 15a of the interstate commerce act, although they said that they were not asking the full amount at this time because of the time required to effect a complete readjustment of rates. While references were made to the financial emergency it was not described, as in so many of the opposing briefs, as a "temporary" emergency and the position was taken that the emergency was largely caused by failure to receive a fair return in the past.

New Standard Set by Section 15a

The opening statement for the carriers was made by Clyde Brown, general solicitor of the New York Central, who expressed appreciation of the expedition shown by the commission in handling the case, which he said was fully responsive to the exigencies of the situation. He devoted his argument mainly to an exposition of the duty of the commission under Section 15a and to the purpose of Congress when it enacted the transportation act in 1920 to include a new concept of reasonable rates "surcharged with revenue considerations" to be "superimposed" on the provisions in the old law requiring that rates shall be "just and reasonable." He said that when he referred to this as a revenue case he meant that the expression "just and reasonable" rates in Section 15a is "shot through with revenue considerations and weighted with the standard of a fair return." Prior to 1920, Mr. Brown said, the constitutional right of the carriers to a fair return was "practically worthless" but the 1920 law attempted to change an "inadequate and practically unassertable constitutional right into an adequate statutory right" by adding a requirement that rates as a whole shall be adequate to allow a fair return. When Commissioner Eastman asked if he thought Section 15a had repealed or modified the provision for reasonable rates in Section 1 Mr. Brown said "it overlays it with a superior mandate."

Mr. Brown used much of his time in reading from and commenting upon the opinion of the late Chief Justice Taft in the Dayton-Goose Creek case, interpreting Section 15a, in which the court held that "rates which as a body enable all the railroads . . . to enjoy not more than a fair net operating income . . . are reasonable from the standpoint of the individual shipper," and in which it referred to the recapture plan as taking care of "the excess caused by the discrepancy between the standard of reasonableness for the shipper and that for the carrier due to the necessity of maintaining uniform rates." It follows, Mr. Brown said, that rates, otherwise reasonable, become unreasonably low if the general schedule of rates, of which they are a part, produces revenues which in the aggregate fail to attain the results contemplated by Section 15a. He said he had noticed that most of the opposing briefs failed to mention this decision.

Roads Urge No Exceptions

When Mr. Brown said that a traffic man cannot say what particular individual rates should be to make their proper contribution to a fair return, Commissioner Lewis asked if it would not be necessary to refer to the traffic men for the exceptions which the railroads are expected to make later. Mr. Brown said that there will be a place for them if the rates discourage patronage but that the railroads had referred to "adjustments," not to "exceptions," and he emphasized that the commission should make no exceptions in the first instance but treat all classes of traffic alike and give none a preferred status. In the railroad brief it was stated that it must be conceded that "each class of traffic owes to the railway service additional compensation," and that "the debt is there whether it can be collected or not." If the carriers had proposed to make exceptions, Mr. Brown said, the commission should not permit it to be done.

Commissioner Eastman asked whether the commission will have performed its full duty under 15a if it grants the increase proposed by the carriers. Mr. Brown replied that since the commission did not see any necessity for the performance of its affirmative duty by making an investigation as suggested to it informally by some eastern railway executives, and since the carriers thought something ought to be done but had made a proposal which falls short of the requirements of the law, he thought the commission might accept their proposal, without further responsibility for the present, as an exercise of their managerial discretion. If the commission can not do that, he said, it is its duty to go ahead and figure what is necessary to produce a fair return.

"Can we accept that as an indication that no further increase will be necessary?" asked Mr. Eastman. "You might repose on that for a while," answered Mr. Brown. "You have for some time. Your duty is not one that has to be performed every month; it is to be working on this proposition, but you have laid aside your statutory duty for some years while you have been working on Hoch-Smith cases." Mr. Brown said the railroads had "practically split the difference between what they are earning now and what the law requires" as their "contribution to the prosperity of the country."

Referring to the pooling plan proposed by the National Industrial Traffic League Mr. Brown said it was "illegal" and "violated the fundamental principles of a jackpot" because under it some carriers making contributions could not possibly receive anything while other carriers necessarily failing to make any contribution would receive something. He said that the league, having just learned about the New York savings bank law, had suggested that the standard of one and one-half times fixed charges be used as the standard of return during the depression, but that "that is not the point of credit, it is the point of discredit." The brief also made the point that it is wholly impracticable to ascertain the net monetary advantage to a given carrier of a rate increase and that the net railway operating income has no proportionate relation to fixed charges.

Truck Competition

Other phases of the railway argument were presented by W. F. Dickinson, general solicitor of the Chicago, Rock Island & Pacific, and three-quarters of an hour was reserved for rebuttal. He expressed the belief that no more traffic would be diverted to other forms of transportation if rates are increased than would be diverted anyway, because the adaptability of particular traffic to the service of water-line, truck or pipe-line service is a more important factor than the rate factor. Referring to the testimony of Dr. Parmelee at the Chicago hearing that it would require over 400,000 more trucks, costing $1,200,000,000, to carry enough freight to offset a 15 per cent increase, Mr. Dickinson said that interest on that investment plus $400,000,000 for wages for the drivers of the trucks, would amount to as much as the proposed rate increase. Commissioner Lewis said it is impossible to brush away all the evidence in the case regarding plans of shippers to make use of other forms of transportation and Commissioner Meyer asked if the influence of price competition is not an important factor inducing some shippers to resort to other transportation who would prefer to use railroad service.

Preservation of Railroad Credit Asked

Charles E. Hughes, Jr., for the committees representing security holders, said there had been such a "collapse of railroad credit as to threaten to dry up the reservoir of capital for railroad investment" and that the "genesis" of Section 15a was the intention of Congress to maintain railroad credit. When he urged the commission not to allow the impression that it was taking a "defeatist" attitude that nothing can be done, Commissioner Eastman asked if the committee he represented had not given the investing public the impression that "their only hope of salvation is this rate increase" and if it is not possible "that this rate increase is the worst possible thing that could be done." Mr. Hughes said he would not concede that.

Mr. Hughes said that even an upturn in railroad business and an increase in earnings would not, in itself, bring the credit of the carriers back to the condition it enjoyed prior to the depression, because it has been demonstrated that railroad bonds are a "fair-weather" security, and because in the 11 years since the passage of the transportation act the railroads have never yet earned the fair return contemplated by law. He said the collapse in railroad credit was not attributable solely to the depression and that "confidence in railroad securities cannot be restored except by the taking of such steps now as will convince investors that the country is determined to protect the stability of their investments in good times and bad alike, and that their experience with railroad bonds during this depression will not be repeated in the next."

Grenville Clark, for the committee representing savings banks and insurance companies, who argued that to grant the carriers' application represents the only practicable method of meeting the present emergency, also said that this would not constitute a permanent solution of the problem of railroad credit and that the commission and other public authorities concerned, together with the managements of the carriers, should make a concerted and substantial effort to effect permanent measures to secure the nation against a recurrence of the present emergency. Asserting that the law has "broken down," he suggested the appointment of a representative committee to take steps between now and the opening of Congress to formulate some plan, considering "what should be done to make the law work" and whether it should be amended to bring all forms of transportation within a system of federal regulation. Possibly a revolutionizing of the whole rate structure would be necessary, he said.

When Mr. Clark said the commission should accept the judgment of the railway executives, Commissioner Eastman asked whether it was true that the rate application represents the judgment of the railroad executives or that of "some one else." Mr. Clark said he supposed that meant the bankers, because there had been many "whispers" to that effect, but that "any such idea is unqualifiedly false, that the bankers have forced these executives to go on the stand and perjure themselves." He said the security holders' committees were not formed until after the railroad executives had reached their decision to ask for the rate increase.

"We appreciate," said Mr. Clark, "that there is a large mass of testimony from shippers to the effect that the traffic in their particular commodities cannot bear additional freight charges and that further diversions to other methods of transportation would result. However, it is apparent that much of this testimony was given without regard to, or adequate knowledge of, the financial condition of the railroads. Moreover, it must be remembered that practically all of this testimony was naturally given with special regard to the supposed interests of the particular industry, rather than in view of the necessities of the nation as a whole, and from special standpoints which do not sufficiently take into account the necessity of relief in the national interest."

What has come to be almost a standard question in important cases before the commission, as to the representative character of presentations made in the name of the National Industrial Traffic League, was raised when A. H. Brown, of the Cleveland Chamber of Commerce, who had testified during the hearings in favor of a rate increase, declared that the brief filed on behalf of the league by a special committee is "not what it purports to be." He said that the pooling plan was proposed with-

out authority, and that the analysis of facts presented was drawn in "a spirit of opposition" and was solely expressive of the views of the special committee.

Pooling Plan Suggested

Luther M. Walter, attorney for the league, said that it was true that the league had expressed no position for or against the railroad application. Its only action had been to direct a special committee and counsel to "aid in the development of all pertinent facts for the consideration of the commission" and he said he was appearing without authority and "advocating nothing." A foreword to the brief said that the league had not considered the desirability of the pooling plan. He declared that the railroads in the original presentation of their case had emphasized its emergency character, although they "may have changed their attitude," and had said they were concerned with the credit of the carriers as a whole. He said that the needs of the carriers having earnings less than one and one-half times their fixed charges could be met by an increase in freight revenues of only $225,566,718, or 6¾ per cent, if pooled and used for their benefit alone, and asked why the "hypodermic" should not be given to the "weak railroads that need it and not to the giants that do not."

"That is something for you to consider," he said, adding that the amount might be still further reduced if the commission could change its accounting rules to take rents for leased roads out of the category of fixed charges. The brief attempted to answer some of the railroad objections to the pooling plan and also discussed the question as to whether the commission has power to authorize increases in rates recently prescribed by it as maximum reasonable rates, without a showing of changed conditions warranting such increases.

Mr. Walter was followed by R. C. Fulbright, who is chairman of the league special committee but who made no pretense of neutrality, saying that he was a "free lance" speaking for clients and himself. He ridiculed the argument that there is any railroad credit emergency and said that the best thing that could happen to the railroads would be that the commission should deny their application and tell them they cannot increase freight rates until they do something for themselves. This is the first rate case, he said, in which the railroads have excluded testimony of traffic witnesses as to the reasonableness of rates and taken the position that the condition of individual roads is not relevant, and "the first time that Wall Street has set up a self-styled investment standard and asked the commission to make rates to meet it. It is the first time that the railroad and financial interests have combined in a campaign of propaganda and solicitation to beat down the opposition." Not a railroad has appeared in this case to show that it needed anything, he said, and he cited sales of railroad bonds this year and last year in refutation of the testimony on behalf of the security-holders regarding the collapse of railroad credit. He said the roads in 1930 had sold the largest volume of bonds of any year since 1920 and in the first six months of 1931 had marketed $319,000,000 of bonds at an average of 4.63 per cent, including $199,000,000 in April, May and June at an average of 4.53 per cent. He said that many industries have been lulled into a feeling that they will be exempted from the increase if it is authorized, but that if merchandise is exempted because of truck competition the carload shipper will pay the bill. Mr. Fulbright said he had at first been inclined to give careful consideration to the railroad application, until he had learned how many bonds they had been able to sell and that the "so-called danger of the motor truck can make no more than a dent in railroad transportation." He also said that the commission could greatly reduce the requirement of the New York banking law by changing its definition of fixed charges to exclude rentals for leased lines where most of the stock is owned by the operating company.

Arguments largely devoted to contending that the railroad's interpretation of Section 15a was based on a misconception were made on September 23 by Wilber La Roe, Jr., representing the Associated Industries of New York State, J. Van Norman, representing southern coal and hardwood interests, and J. E. Benton, general solicitor of the National Association of Railroad and Utilities Commissioners, who appeared on behalf of the legal committee of western state commissions that have asked the commission to dismiss the proceedings. Senator Brookhart, of Iowa, also made an argument, urging the commission to make a revaluation of the railroads and to reduce the percentage of fair return. He said that since the Supreme Court has held that value should be based on cost of reproduction "this is the best time you ever had to give consideration to cost of reproduction." Commissioner Lewis called his attention to the exhibit filed by the commission showing estimates by the Bureau of Valuation on the basis of current prices, which considerably exceed the valuation which the Senator has so often condemned, but Brookhart apparently had not read it.

Mr. Benton called attention to the reduction in wages announced the day before by several steel companies as an example which ought to be followed by the railroads instead of trying to keep their wages and rates out of relation to conditions in other industries.

Commissioners Indicate Doubt

Throughout the argument members of the commission asked questions indicating considerable doubt as to their authority to allow increased rates under the provisions of Section 15a without a finding that increased rates would be "reasonable" under the older sections of the act. Commissioners Meyer and Aitchison said the commission had been fairly consistent in its interpretation of Section 15a. Commissioner Tate said he thought the section required the commission to make an effort to make rates that would produce a fair return but that he had some doubt as to whether it should be done in a time of depression, and once he asked if the commission could not reduce rates if it thought lower rates would increase revenues. Commissioner Farrell also questioned some of the arguments as to 15a. Commissioner McManamy, when Clyde Brown referred to the railroad proposal as a "life-preserver," asked what the commission should do if it found "sand in the life-preserver." Commissioner Eastman, referring to some suggestion regarding a tax increase, asked if a rate increase, like a tax increase, should not be placed with some relation to the ability to pay.

The general brief for the carriers declared that the "proper course" in the present situation is to increase all freight rates 15 per cent, but that if the commission does not agree with this conclusion," the matter does not end there. The commission's continuing duty under Section 15a persists and it becomes a question for it to decide what different method of conforming to the requirements of that provision of the act should be pursued if the proposals of the carriers are not approved."

On the basis of the experience of the first half of 1931 it was estimated that the net railway operating

income of the carriers for the year will amount to $553,000,000, producing a return of 2.25 per cent on the 1920 valuation plus net additions. If the freight revenue for 1931 under existing rates be increased 15 per cent, and if there be deducted from the net railway operating income thereby produced the additional taxes which would become applicable, it is found that the net railway operating income would become $985,000,000, produced by the net railway operating income under existing rates of $553,000,000 and the prospective increase in net railway operating income under the proposed rates of $432,000,000. The return will be 4.01 per cent, as contrasted with an estimate of 3.91 per cent based on the four months' figures available at the time the application was filed.

Valuation

Concerning the valuation of the properties, because of the emergency character of their application, the uncompleted condition of valuation, and the desirability of excluding, as far as possible, all grounds of controversy in order to expedite a decision, it was stated that the carriers have been content to predicate their application upon a sum arrived at by taking the aggregate value found by the commission in 1920 and adding to it the cost of additions and betterments, minus retirements, made since that time. Since this aggregate value was less than the book cost of road and equipment of the carriers at that time, it follows that the total which was used as the basis of the application is correspondingly less than the total book cost of the road and equipment accounts of the carriers.

It was pointed out, however, that "the commission caused to be introduced an exhibit, giving the results of certain compilations made by its Bureau of Valuation. This exhibit, as corrected by Commissioner Meyer, shows that using 1930 period prices the reproduction costs for all Class I carriers as of December 31, 1929, were: reproduction new $26,864,303,934; less depreciation $21,298,024,016; using 1931 spot prices the corresponding figures are: reproduction new $26,033,317,372; less depreciation $20,638,679,367. The Bureau also estimated the original cost to date of all property of Class I carriers, excepting land, as of Decembr 31, 1929, at $21,164,643,979. The Bureau estimated the present value of the lands of Class I carriers as of December 31, 1929, at $3,409,135,849. The figures employed by the carriers in their application including all classes of property devoted to public service were for the Class I carriers $24,566,756.055. The lowest combination of the cost of reproduction less depreciation and land figures furnished by the Bureau produces $24,047,815,216.

"This total is $518,940,839 less than the total used by the carriers. But the figures of the Bureau do not include anything for additions and betterments provided during 1930. These amounted to $602,256,894. Due allowance for these improvements would produce a total of greater magnitude than the total used by the carriers. The usual consideration given by the Commission to intangible values would further increase the figures of the Bureau.

"On any conceivable basis of valuation it is manifest from the record that the carriers are falling so far short of earning the fair return contemplated by the law as to make the question of the actual aggregate values of the properties devoted to common carrier purposes unnecessary to determine in this case."

The western roads in their brief asserted that "the only remedy available to avert a return to the former period of car shortages, congestion and delays requires that no more be done than to allow the provisions of existing law, including Section 15a of the act, to be fully administered according to their plain intent and purpose.

"This would enable the railroads to function efficiently and maintain for the public an adequate system of transportation," they said. "The rule of law is well settled that in such a proceeding the issue is one of fair return, and that evidence relating to specific commodities or groups of commodities, and the separate rates thereon, is not relevant to that issue.

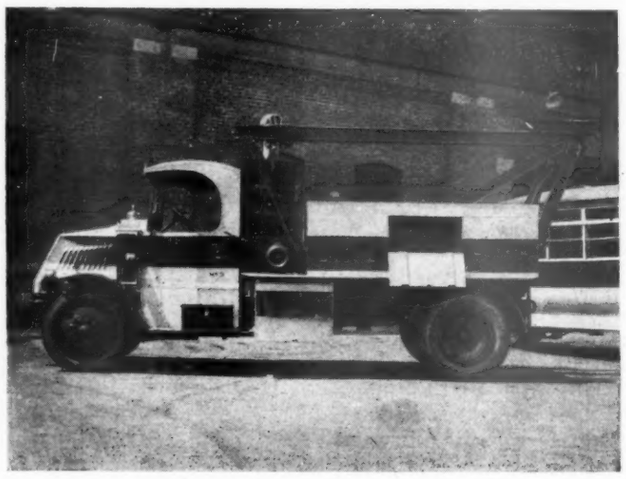
"The assumption by some of these shippers that the rate increases proposed will divert traffic to other agencies of transportation, and thus defeat the purpose to obtain additional revenue, is not supported by the evidence, and is a mere forecast with which the officers of the roads do not agree.

"The present revenue situation is too critical, and the necessity for adequate relief too urgent, to excuse the trial or adoption of any half-way measures or expedients.

"Unfortunate general business conditions should not be permitted to distract the attention of the commission from the task which has been committed to it by Congress, namely the enforcement of Section 15a, which was intended to prevent just such situations as that now confronting the railroads. The managements of the railroads throughout the country have united in a plea to be allowed to work out their salvation by means of a general 15 per cent increase in freight rates and charges, basing this plea not upon any request for special consideration but upon the sound basis of what is contemplated by Section 15a. The outcome rests with the commission."

The brief on passenger service said that the criticisms indicate a lack of understanding of the practical problem involved. It is pointed out that since January 1 ten passenger trains have been eliminated between Chicago and St. Paul and Minneapolis; six between Chicago and Omaha, four between Chicago and Kansas City, eight between Chicago and St. Louis, and two between St. Louis and Kansas City, a total of 4,527,938 passenger train-miles yearly. The existing passenger service, the roads say, is not excessive but is essential to meet the reasonable needs of the public and the trains operating between those cities "are the best providers of passenger train revenue and the chief support of passenger train operation."

* * *



A Heavy Duty Wrecking Vehicle in the Service of the County Transportation Co., a N. Y., W. & B. Subsidiary

Willard Discusses Rates, Wages, Consolidation

STATING that "the railroad presidents, of which I am one, have, in a measure, been at fault in that they did not urge more vigorously in the past when business was good, that the established rate basis be maintained," Daniel Willard, president of the Baltimore & Ohio, defended the proposed increase in freight rates before a meeting of the Great Lakes Regional Advisory Board at Akron, Ohio, on September 23.

Discussing the possibility of a wage reduction, Mr. Willard said:

"The amount paid by all the railroads for wages during the year 1930 was $2,589,000,000. A 10 per cent reduction of that amount would yield, roundly, $259,000,000. One of the compelling reasons for not seeking a reduction in wages was that, under the law, a reduction could not be made in time to be of assistance in the present emergency. Congress gave expression in the Transportation Act to its views concerning the matter of railroad wages, and outlined a course of procedure to be followed in connection with proposed reductions. The procedure so outlined contemplates initial conferences between the railroad managers and their employees, and, if these fail, the next step is mediation and a board of mediators has been set up in Washington to deal with such problems. If mediation should fail, arbitration is then to be sought, and the arbitration of a question of such complexity, would, undoubtedly, consume many weeks, perhaps months. If arbitration should be rejected, the law provides that a Fact-Finding Committee shall then be appointed by the President, this Committee to investigate the facts and make a prompt report for the information of the public. During a certain short fixed period the status-quo is to be maintained. A procedure such as I have outlined would, undoubtedly, extend over several months, and with no certainty that the decision of the arbitrators at the end of the hearing would be favorable to the contention of the companies. For the reasons I have mentioned, among others, the railway managers were of the opinion that the present emergency could not be met by seeking a reduction in wages.

Wage Reduction May Still Be Necessary

"This, of course, is not to say that later on it may not be necessary that railway wages should be reduced. Personally, I hope that such a step may not be necessary, but if prices and costs continue to go down, and if wages generally in other industries should be reduced, it might, in such circumstances, be necessary for the railroads, acting in accordance with the Transportation Act, to take the prescribed steps looking to a wage reduction. Such a course would, obviously, not be effective in the present emergency situation, and the only course left open was to seek an advance of freight rates."

Continuing he said:

"I appreciate the arguments that are urged against increasing freight rates in a time of business depression. It is pointed out that merchants, manufacturers and others do not increase their prices in such a time, but on the contrary, reduce them with the hope of stimulating trade. But the kind of industries I have just referred to are not regulated industries like the railroads. When business is good, they are at liberty to increase their charges to any extent that the economic conditions may justify. There is no limit fixed upon their profits. They are in position, therefore, to make provision in good times for the difficulties which may confront them in so-called bad times. Moreover, in bad times, they may curtail their operations as much as they please—suspending business entirely, if that seems desirable. The situation regarding the railroads, as it has worked out, is quite different.

Executives Not Insistent Enough on Fair Return

"I have often said that, in my opinion, the Transportation Act of 1920 is, upon the whole, the most constructive piece of railroad legislation ever enacted. That the results flowing from the Act have been disappointing in many respects, is to be regretted, but they are not due to the Act itself. Probably the railroad presidents, of whom I am one, have, in a measure, been at fault in that they did not urge more vigorously in the past, when business was good, that the established rate basis be maintained, or even increased to the extent, at least, of yielding the rate of return authorized by the Act. They have also been at fault, in my opinion, in that they did not seek more vigorously to bring about that measure of consolidation which the Act contemplates, and without which our scheme of regulation as provided in the Transportation Act is incomplete and defective. It is quite possible that action such as I have suggested might have saved the roads from the position in which they now find themselves. I do not impute to others, however, any criticism or blame in this connection which I do not accept for myself.

"I believe that in that particular portion of the Act where it is provided that one-half of whatever any railroad may earn above six per cent upon the value of its property used for transportation purposes shall be set aside and held in a reserve fund to be used for interest and dividends, is to be found the cure for the disease from which the railroads are suffering at this particular time. I recognize, of course, that when Congress provided for the division of excess earnings and the establishment of a reserve fund it had in mind a somewhat different phase of the problem than the one I am now discussing. Congress had especially in mind the unreasonable returns which is was feared some of the more fortunate roads might realize from rates fixed with reference to the needs of the whole, but even so it was realized that there might be and probably would be times of business depression when the earnings of even such fortunate roads would be inadequate, and it was provided that in such times monies accumulated in the reserve fund could be made use of to the extent that the carrier fell short in any one year of earning the rate of return specified in the Act.

Consolidation a Solution to Major Problems

"With a full realization, however, of the difficulties of regulation under the conditions then existing, Congress, as I have already shown, announced the policy of consolidating the railroads of continental United States into a limited number of groups of as nearly equal strength as might be possible. Unfortunately the results contemplated by this part of the Transportation Act have been only in part accomplished. If consolidation as contemplated in the Act should be brought about in the Eastern Region—and I confine my remarks for the moment to that region, because it is the one with which we are most familiar—I believe it would then be possible for the Commission to fix rates which would yield approximately the same rate of return upon each of the limited number of systems resulting from such consoli-

dation, assuming, of course, that the scheme of consolidation was wisely worked out and that the several systems resulting from consolidation were managed with equal or approximate efficiency and economy. In such circumstances the theory underlying the reserve fund could be made use of so as to accumulate in times of business activity, when the rate itself has little, if any, effect upon the volume or movement of business, a surplus which could be drawn upon in times like the present to the extent specified in the Act, thereby relieving the railroads from the necessity of raising rates, reducing their forces and curtailing their purchases to the utmost possible extent in times of temporary depression."

Block Signal Mileage, 1931

THE Interstate Commerce Commission has issued its annual tabulation of block signal mileage, etc., as of January 1, 1931. The aggregate total number of miles of road shown as signalled in this and the three preceding bulletins appears as follows:

	1931	1930	1929	1928
Automatic	62,726.0	60,162.0	56,488.6	53,616.5
Non-Automatic	54,144.0	55,551.7	58,755.9	59,375.9
Total	116,870.0	115,713.7	115,244.5	112,992.4

The net increase in length of road signalled, 1156 miles, is the result of an increase of 2564 miles in automatic and a decrease of 1408 miles non-automatic. This increase in automatic mileage compares with an increase reported one year ago of 3673 miles, and the year before that, 2872 miles.

It will be noted that the increase in 1930 is 1129 miles less than the mileage of automatic block signals completed during 1930 as shown in the *Railway Age* of January 3 last. This discrepancy is explainable by the inclusion in our tables of new signals which replaced old ones, and a considerable mileage of track which is in Canada. The non-automatic column is increased by 232 miles on the Denver & Salt Lake and 57 miles on the Rutland. The New York, Ontario & Western reports a decrease of 44 miles, automatic.

The total length on which visual cab signals are in use is 3805 miles of road and 7763 miles of track. Of this, 976 miles of road is reported by the Pennsylvania, which includes an extensive mileage where automatic train control is not in use. Three roads—The Atchison, Topeka & Santa Fe, the Chicago & North Western, and the Illinois Central—use cab signals [and automatic stops] where there are no wayside automatic signals between stations.

The mileage of road now equipped with color-light signals is 18,111 an increase of 2615 miles over the year preceding. This includes color-position-light signals on the Baltimore & Ohio, which system now totals 530 miles of road. The Pennsylvania reports 2015 miles of line equipped with position-light signals, an increase of 263 miles over the last preceding report.

The length of *track* equipped with normal danger automatic signals, 6925 miles, is 93 miles less than the total shown in the preceding year. The Missouri Pacific reports an increase in normal danger and the New York Central a decrease.

Automatic train control is in use on 11,546 miles of road, or five miles more than on January 1, 1930; number of locomotives equipped 9,227, an increase of 255. The Michigan Central reports 108 miles of road and 69 locomotives in Canada.

Grade crossings of one railroad with another which have signals automatically interlocked, without interlocking machines, are reported by 64 railroads. Those reporting more than 10 such crossings are:

C. & N. W.	48	Minneapolis, St. P. & S. S. M.	13
C. M. St. P. & P.	29	Missouri Pacific	18
C. R. I. & P.	27	N. Y. C.	11
Great Northern	30	Northern Pacific	18
Minneapolis & St. Louis	11	St. Louis-S. F.	12

Centralized traffic control is reported by 20 roads; miles of road thus operated, 554; number of switches controlled 344, which is 163 more than the number reported on January 1, 1930.

Power switches remotely operated are reported by 45 roads; number of control points 367; number of single switches 460; number of cross-over switches 211.

The telephone for transmitting train orders is in use on 154,075 miles of road.

Hearings on Railroad Practices

(Continued from page 476)

liability with respect to delivery of carload freight under the line-haul rate. The Director took as an example the case of an industry with a system of plant tracks which receives an allowance for doing its own spotting of cars delivered to it on an interchange track, and another case of a plant which receives cars in the same manner but is given no allowance for spotting. The witness was under the impression that the carrier's obligation in the former case was not discharged until the cars were spotted, else there would be no allowance. In the latter case, however, he stated that the delivery was effected when the cars were placed on the interchange tracks. The director continued his questioning to ask about the demurrage charges on cars in each case and developed that demurrage begins after the cars have been placed on the interchange tracks in both instances. With this situation in mind the witness agreed that in a case where an allowance is made demurrage is accruing at the same time that the line-haul rates are operative. The Director's point, as he stated it, was if delivery on the interchange track is the agreed delivery then under what law is the allowance made? In other words, he said he was attempting to see where the carrier's obligation ceased; if it ends at the interchange track, he continued, then any allowance for services performed beyond the interchange track would seem to be improper.

Questioning next turned to the instances in which the Lackawanna loads and unloads carload freight. Mr. Williams explained that this service is performed at New York under the line-haul rates, whereas at Buffalo, N. Y., a loading and unloading charge of 50 cents a ton is published. When an attempt was made to inquire into the loading and unloading of freight and other terminal services at New York, objections were raised on the basis of the notice of hearing which specifically excluded the New York Harbor marine services. Director Bartel sustained the objection and excluded the New York terminal services from this particular hearing, although he said that they might later become a part of the general inquiry. The remainder of the session on September 23 was consumed by arguments of counsel as to what particular testimony with reference to the New York situation was excluded by the Director's ruling.

Motor Transport Section

Why Shippers Use Trucks*

A survey of the conditions and considerations which have led industries to patronize motor carriers between New York and Philadelphia

By Russell W. Talbot

Strathcona Memorial Fellow in Transportation, Yale University

IT is generally accepted that motor transportation, because of certain inherent characteristics, is primarily adapted to the distribution of freight in terminal areas. It is evident to students of transportation that motor trucks can perform the service in these areas less expensively and more advantageously than the railroads can ever hope to do by the use of rail facilities alone. It is also accepted that railroads are primarily adapted to providing mass transportation in train loads between terminal areas and can do so considerably cheaper than motor trucks. It follows, from these facts, that the co-ordination of rail and truck transportation for such intercity service has become the line of attack by which the railroads are attempting to regain the long-haul portion of the business they have lost to trucks.

However, it is evident that such co-ordination of transportation agencies will only succeed when a co-ordinated system is found which will provide more satisfactory transportation between cities than is at present being rendered. When an economical system is worked out that will provide material benefits to both the shippers and the public at large, the railroads will be able to accomplish their objective. It was with the hope of providing first-hand data which could be used as a basis for developing such a co-ordinated system of transportation for intercity service that this survey of the shipping situation between New York and Philadelphia was undertaken. This region was selected for the following reasons:

1. The number of concerns shipping between these two points is relatively large; consequently, a suitable background exists for obtaining adequate data.
2. Motor truck transportation is well established in this region and the volume of freight carried by truck between the two cities involved is large.
3. These two cities are about 100 miles apart, at which distance motor trucking can very effectively compete with rail transportation.

In order to make as broad a survey as possible in the time available, an endeavor was made to obtain data from representative concerns in each of the various industries which shipped by motor truck between the two points.

The reasons why each concern ships by motor truck between New York and Philadelphia are tabulated substantially as obtained from the various traffic managers. Accordingly, it is only natural that many of these reasons are generalities, often colored by personal viewpoints, with the result that in some instances inaccurate personal conclusions have been drawn. It was found necessary, therefore, for the purpose of this analysis, to break down each reason into one or more basic factors rather than to accept it at its face value. After following this procedure, the conclusion was reached that there are 10 distinctly separate factors controlling the situation. An explanatory list of these factors follows:

1. Over night delivery.—This involves movement between the shipper's plant and the consignee's store door, between the plant closing time and the store door opening time the next morning.
2. Shipping cost.—This includes the cost of shipping by motor truck from plant to store door, or by rail, together with any local cartage at either end of the rail haul.
3. Store door delivery by one through transportation agency.—This involves the movement of freight from plant to store door in a single container, car, or truck; or by any other method not involving transfer en route.
4. Loss and damage.—This covers any loss of or damage to goods in transit caused by the rough handling of or damage to transportation equipment or by rehandling at freight transfer stations.
5. Direct contact with the transportation agency.—This refers to close, friendly relations between the shipper and the carrier, serving as a basis for working out the shipper's problems.
6. Non-scheduled rush service.—This refers to service that can be provided for rush shipments at any time, regardless of schedules.
7. Packing requirements.—This covers any formal packing requirements which may be imposed by the different agencies of transportation.
8. Store-door reconsignment without transfer.—This involves the ability to reconsign a shipment arriving at a store door without transfer from one vehicle to another.
9. Settlement of claims.—This involves the promptness and sureness of claim settlements.
10. Factors pertinent to the particular business involved.—This covers special factors which are of concern only to a particular business.

In reviewing the whole situation as represented by these 15 cases, the conclusion was reached that some of the factors involved were essential, others desirable, and still others merely incidental. Therefore, the following system of designating the relative importance of each factor was adopted:

Essential factors, represented by symbol "A".

* From a survey entitled "The Shipping Situation Between New York City and Philadelphia," privately printed for the Committee on Transportation, Yale University. Further excerpts from this survey will be published in later issues.

Desirable factors, represented by symbol "B".
Incidental factors, represented by symbol "C".

The analysis of the reasons why each concern ships by motor truck and a summary of the basic factors involved are presented in Table I.

The Demands of Shippers in Intercity Transportation Service

The following conclusions as to what shippers are demanding of intercity transportation service are based on the summary of the controlling factors involved in this situation, as given by Table I.

1. Overnight delivery.—That overnight delivery is of paramount importance is evident from the fact that in 13 of the 15 cases it was pointed out to be the main reason, or one of the main reasons, for shipping by motor truck instead of by rail; and, in the other two cases, it was considered to be an important advantage of motor trucking. Shipping via rail and local truck delivery between New York and Philadelphia may require from two to three days. Shipment by motor truck

Table I—An Analysis of the Reasons Why Each Concern Investigated Ships by Motor Truck

Case No.	Nature of industry	1 Overnight delivery	2 Shipping cost	3 Store-door delivery	4 Loss and damage	5 Direct contact	6 Rush service	7 Formal packing requirements	8 Reconsignment without transfer	9 Settlement of claims	10 Factors pertinent to the business
1	Paper	A		B	C		B		B		
2	Paper products	B	A	C							
3	Paper products	A		B							
4	Textile	A		B							
5	Textile	A		B			B				
6	Bulk chemical	B	A	C			C				B
7	Chemical	A	B	B							
8	Heavy hardware	A	B	C	B						
9	Heavy hardware	A		B			B	B			
10	Floor covering products	A	C	C	B	B	B				
11	Radio sets and loud speakers	A		B	B		B			C	
12	Confectionery	A			A	B				C	
13	Cracker and cake products	A		B	B						C
14	Paint	A		B							
15	Cigar	A		B							
Summary:											
	No. of A's	13	2	0	1	0	0	0	0	0	0
	No. of B's	2	2	10	4	2	5	1	1	0	1
	No. of C's	0	1	4	1	0	1	0	0	2	1

A = essential factors
B = desirable factors
C = incidental factors

provides overnight service, in most instances from plant closing time to store door opening time the next morning. The very appreciable difference in shipping time accounts in part for the importance of this factor.

Motor trucks are able to provide overnight delivery, while the rail carrier cannot, because of the greater operating flexibility of trucks in terminal areas. The practice of the larger trucking companies is to operate their trucks over the road during the night when other traffic is comparatively light. Truck-load shipments move direct from plant to consignee's store door. Less-than-truck-load shipments move to the freight transfer station which the larger trucking companies maintain, where each shipment is trans-shipped to a small or local delivery truck serving the particular territory to which that special shipment is bound. Less-than-carload shipments moving via rail require local motor truck delivery to the freight station at the originating end, and to the consignee from the railhead at the receiving end. This procedure is time-consuming. Another delaying factor is that most railroad freight stations have definite opening and closing hours, and the local cartage service must conform thereto. Carload shipments moving via rail, especially in New York, generally require involved switching moves, which often consume much time, to reach the consignee's plant. In addition, direct delivery requires that the consignee have a rail connection. Such basic characteristics as these explain the difference in the shipping time which these two means of transportation require for movement between the cities involved.

The more outstanding economic consequences that make the factor of overnight delivery so important are listed below:

a. It allows jobbers and dealers (the consignees) to carry reduced inventories and stocks.

b. It eliminates the necessity for large storage facilities or for warehousing, thus allowing the consignee to order in small lots instead of in carload lots as formerly.

c. It allows production to be scheduled to fill orders rather than to maintain complete stocks, which makes for direct savings to the manufacturer, who is also generally the shipper.

2. Shipping cost.—That shipping cost is of prime importance to a few concerns and of some consequence to others is well illustrated by the summary of this factor in Table I. One concern for whom shipping cost was the main reason for shipping by motor truck instead of by rail stated that it deliberately selected the trucker who offered the lowest rate, without placing any great emphasis on other requirements. The other shippers who considered shipping cost an important factor did not go to this extreme, but selected the trucker who offered an average rate and could best fulfill their other requirements.

The 10 other concerns which did not consider shipping cost a factor in their choice of truck transportation apparently did not do so for various reasons; some, because trucking costs were definitely higher than the cost of shipping via rail; others, because they did not pay the shipping charges themselves; and still others, evidently, because they did not have a real grasp of the actual comparative costs.

"One Agency" Desirable

3. Store-door delivery by one through transportation agency.—The movement of freight from plant to store door in a single container, car, or truck, or by any other method not involving transfer en route, is not an essential factor, but a desirable or incidental one to most shippers, as is shown by the summary in Table I.

Shipments by motor truck, when the entire truckload is for a single consignee, move directly from plant to store door without transfer en route. Truckload shipments from one concern to several consignees, or less-than-truckload shipments, move directly in a road truck from the shipper's plant to the freight transfer station of the trucking company in the destination city. The shipments to the various consignees are then distributed from the freight station in smaller local delivery trucks operated by the trucking company. A carload shipment by rail to a consignee with a direct rail connection to the originating line, of course, moves direct to store door withoutt ransfer enroute. Carload or less-than-carload shipments to consignees without rail sidings must be delivered to the store door from the railhead by motor trucks which are not operated by the rail carrier. With such shipments, the shippers in general do not pay or arrange for the local cartage service, leaving that to the consignees. In most cases the consignee maintains standing arrangements with a local trucker for this service and need only notify this trucker by telephone whenever the arrival notice of a shipment is received. If the local trucker has a large number of trucks, he may call at the particular freight station each day and pick up any ship-

ment for his regular consignee customers without the necessity of being notified. On the other hand, if the consignee rarely requires the use of such local delivery service, he may find it best to make individual arrangements for each shipment.

This difference in the terminal area delivery service rendered by these two means of transportation, so far as this factor is concerned, is thus merely one of convenience, eliminating the following actions on the part of the consignee.

a. Making arrangements with some local trucker for cartage service.
b. Having a clerk follow up arrival notices and see that the cartage service is being properly rendered.
c. Accounting in connection with the local trucking bills.

4. Loss and damage.—The summary in Table I shows that loss and damage is an essential factor to a few shippers and a desirable or incidental one to others in their choice of motor truck transportation over rail. Those concerns to whom this factor is of consequence have products which can easily be damaged in transit and which are shipped mainly in l.c.l. lots.

Less-than-carload shipments moving by rail must be transferred from local delivery trucks at the receiving end of the rail haul, and to local trucks at the delivery end for cartage to the consignee. Carload shipments bound for consignees who have no siding facilities must be trans-shipped to trucks for delivery. These movements by rail involve two rehandlings and one rehandling, respectively, compared to one rehandling for a through haul in a single container. It is this rehandling process which is the cause of much of the loss and damage to goods in transit. As outlined above under factor 3, shipments moving by motor truck to freight transfer stations for local delivery require only one handling.

Some of the shippers claim that truckers use more care than the railroads in rehandling freight. The direct contact which the shippers have with the truck drivers allows personal instruction concerning the proper care of fragile freight. Judging by the data obtained, loss and damage to freight in transit caused by the rough handling of, or damage to, transportation equipment is very slight in this intercity service.

The more important economic consequences which result from loss and damage are:

a. The loss of the jobber's or consumer's good will because goods are received in imperfect condition.
b. The inconvenience and delay caused by the necessity of rushing shipments to take the place of those lost or badly damaged in transit, with the consequent irritation of the consignee.

Direct Contact

5. Direct contact with the transportation agency.—The summary in Table I shows that the factor of direct contact with the transportation agency is of consequence to relatively few shippers. These are for the most part small concerns with special shipping problems difficult to solve.

This survey indicates that the railroads, on the whole, co-operate to the fullest extent with the larger shippers, but often are inclined not to make special efforts to solve the problems of the smaller ones. It should be pointed out, however, that it is a physical impossibility for any railroad to grant all of the special services which the various shippers request without obstructing the operation of the railroad and increasing operating expenses beyond reason. Some of the smaller shippers are of the opinion that the railroads slight them in favor of the larger ones. The trucking companies, on the other hand, being much smaller organizations, maintain a direct friendly contact with each shipper. The traffic manager does business directly with the owner or district manager of the trucking company and is thus able to obtain full co-operation in solving shipping problems. The trucker is obliged to do this to maintain the good will of the traffic manager and to retain business, because of the strong competition among the trucking companies operating in this intercity service.

The factor of direct contact influences the shipper in his choice of transportation only when he has some particularly difficult shipping problem to solve. In both of the industries encountered during this survey where direct contact was of importance, the problem which had to be solved was in connection with the elimination of damage in transit to certain of their products.

Rush Service Important to Some

6. Non-scheduled rush service.—The summary in Table I indicates that the ability to obtain non-scheduled rush service whenever needed is important to certain shippers. This factor is of consequence to those industries whose business is of such a nature that occasional rush deliveries are required by their customers. Many of these industries manufacture partially or entirely to order and thus do not maintain a stock from which to make prompt deliveries. In such instances an expedited form of transportation service is valuable in reducing the total delivery time.

Railroads, because of the very nature of their operation, are unable to provide expedited service for rush shipments, either in express service or in regular l.c.l. freight service. Many of the trucking companies, on the other hand, will provide the shippers with whom they are doing business such service at any time of the day. When this service is required, they operate a truck over the road on a special trip direct to the consignee's door. If the rush shipment is of truckload size, the shipper is generally charged the regular rate. If it is a less-than-truckload shipment, the shipper is required to pay on a truckload basis to enable the trucking company to make a reasonable profit on the special move.

The factor of non-scheduled rush service has the following economic advantages:

a. It makes possible very prompt delivery on rush orders, which is valuable in obtaining the customer's good will.
b. It makes it possible for time lost in production delays on goods manufactured to order to be made up in part by delivery which is more rapid than the normal.

7. Packing requirements.—The factor of packing requirements influences a relatively small number of shippers in their selection of motor truck transportation. The industries to whom this factor is of importance have products of such a nature that the railroads find it necessary to impose formal packing requirements upon them in their tariffs in order to minimize damage in transit.

The railroads, because of their size and the volume of their business, find it necessary to permit exceptions to this code of requirements only in the case of certain commodities, stipulated in the tariffs, for which a higher rate is charged. The truckers, on the other hand, have no formal requirements and will accept anything for transit provided it is packed well enough to protect it from damage. Therefore, when any industry develops a special method of packing its products, the trucker will readily accept them, while the railroads will not do so until formal application has been made and the tariff changed. These special methods of packing often enable the shipper to save both in labor and in the cost

(*Continued on page 490*)

Is "Supplementary" Bus Service "Competitive"?

Officers in charge of railway motor coach operation describe the benefits derived through operating highway routes parallel to railway lines

OPINIONS differ as to the advisability of a railway operating motor coach service between points adequately provided with railway service. The difference in opinion is indicated by the difference in the expressions by which such motor coach lines are described, those favoring the operation of such highway lines describing them as "supplementary," and those in opposition describing them as "competitive". It is not to be understood that all those who oppose the operation of "competitive" bus lines by railways are opposed to all bus operations; on the contrary, some of them are strongly in favor of the operation of motor coaches when these can be substituted for expensive and unprofitable passenger trains. Their opposition, instead, is based upon the belief that, on lines where train service is maintained without material reduction, it is inadvisable to sponsor a competitive carrier, which may have the effect of diverting from passenger trains even more messengers than might be taken from them by independent highway competitors.

Quite the opposite opinion is held by officers in charge of railway motor coach service of this "supplementary" or "competitive" kind. Believing that this question is one of general interest to railway officers, the *Railway Age* addressed to railway men in charge of motor coach services a questionnaire designed to bring out their opinions on this matter and the experiences upon which they base their opinions. The questions submitted were as follows:

1. Toward what purposes did your company establish its intercity motor coach lines competitive with its railway lines? How successful have these lines been in accomplishing your purposes?
2. Do you find that such lines have a tendency to drive out competitive bus lines, to maintain rates at a reasonable level, or to earn a profit for your company?
3. In the future development of your motor coach lines, do you anticipate that most of the new routes will be supplementary and competitive with train service, or in replacement of train service?

Anticipated Regulation

The desire to anticipate regulation of interstate motor coach lines is mentioned as a factor in the establishment of bus routes competitive with railway service, by an officer in charge of one of the pioneer railway motor coach operations. He says, "In 1925, it was somewhat uncertain as to just what would take place in the competitive interstate bus field, and we felt that in view of this uncertainty, it was better for us to be in it than out of it. We went on two important routes in our territory, feeling that if there was to be regulation we should be in a position to apply for a certificate, and that being in operation might tend to stabilize the competitive situation and also the matter of rates. As to regulation, we, of course, have gotten nowhere, but as to curbing wild competition and in general the cutting of rates, we have been quite successful. We have had the feeling that the motor coach affords a means of transportation to some people who are not willing to pay the railroad rate of fare, and it being impossible, at least in our territory, to reduce the railroad fare profitably in order to get this traffic, motor coach service for them seems to be the only answer. To reduce our rates on the railroad for the large number of people traveling in order to attract to the trains the small percentage who are moving by motor coach, would be ridiculous and would result in a large decrease in gross revenue."

The conviction that motor coach routes parallel to railway lines are "supplementary" rather than "competitive" with them, is expressed by P. J. Neff, vice-president and general manager of the Missouri Pacific Transportation Company and assistant vice-president in charge of passenger traffic of the Missouri Pacific. Mr. Neff says, "You ask the question, why our company established its intercity motor coach lines competitive with its railway lines. I think you have drawn a conclusion in the question which is not exactly in accordance with the facts, and you might just as well ask why a railroad operates four trains for the service of the public instead of only one. The facts are that there are certain requirements for transportation in a given territory. Formerly these were largely met by the use of railroads, but since the construction of improved highways the transportation picture has changed and it is not practical from an economic standpoint to operate as many trains, or the same character of trains, as was done formerly. The establishment of bus service merely meets a part of the public demand for transportation. If it is not operated by a railroad, it will be operated by someone else. If the two are to be operated to the greatest economic advantage, there should not be any unnecessary competition between them. Our plan has been to give the public the various kinds of transportation they desire, each standing upon its own feet. The question involved is the extent to which the public uses this transportation and not competition between the railway and the motor coach service. Each has its own patrons and each has its appropriate amount of service."

A similar view is expressed by the officer of another railway who asks that his name and that of his company be withheld. He says, "As there was unquestionably a demand for bus service, it was our desire to accord the public a choice of either form of transportation, and, to the extent possible, to protect our rail lines from ruinous competition. We were generally successful in accomplishing this result in the case of our intrastate intercity lines, where we had been accorded the protection of the public service commission. In the case of the interstate lines, however, the result has not been so

satisfactory, due to lack of control and indiscriminate competition, both as to rates and service. The situation between two of the principal points on our line presents a most glaring example, where rates are ridiculously low—in some instances, where 10-trip tickets are purchased, averaging less than one cent per mile—notwithstanding that in many cases round-trips are necessary to handle one-way loads. The principal advantage, therefore, in paralleling our rail lines in interstate service is that we thereby become a factor to be reckoned with. Also these lines have been slightly profitable. In other words, we are hoping for the day when some form of control will be exercised and, of course, by that time our lines will have been established."

Has Accomplished Objectives

The St. Louis Southwestern has accomplished its objectives in establishing motor coach routes along its main lines. J. R. Turney, vice-president in charge of traffic says, "Motor coach service is more comfortable more flexible, and much more economical than local train service. For these reasons motor coaches are much more effective in recapturing passenger business lost to the private automobiles than any form of rail transportation with which we are familiar. Our motor coach lines were established to accomplish three objectives: (a) Recapture of local passenger business; (b) the substitution of a more economical means of transportation for local passenger train service, which it was necessary to provide, even at a loss; (c) to enable our passenger trains to be operated on through schedules and with a limited number of stops. These objectives have been accomplished."

The Southern Pacific, according to C. R. Harding, assistant to the president, established its intercity motor coach lines primarily as a substitute for passenger train service, but in a few cases to hold to its treasury passenger revenues which would otherwise have been diverted from trains to independently-owned competitive bus lines. Buses operated by the Southern Pacific replaced 306,894 train miles in 1928, 551,928 train miles in 1929, and 31,031 train miles in 1930, or a total of 889,853 train miles eliminated. The operations of the companies, including the Southern Pacific's subsidiary, merged into the Pacific Greyhound Lines, have been profitable, according to Mr. Harding. The Southern Pacific has about a one-third interest in this system.

A desire to provide the type of transportation service wanted by its patrons was the reason for the establishment of motor coach routes by the Union Pacific, according to J. L. Haugh, vice-president and assistant to the president. He says, "The policy of the Union Pacific has always been to provide the public in its territory with first class transportation facilities. We believe that the motor bus performs a useful function in the scheme of transportation and that there is a public demand for such service. In building up the system, such lines were acquired as could be secured at reasonable figures, retaining wherever possible the organizations and local contacts and consolidating duplicating services where several headquarters were maintained in different cities by the purchased companies. An increasing patronage seems to indicate the soundness of the policy of coordinating motor bus and rail service."

What Benefits Derived?

Replying to the second question referred to above—relative to the effect of motor coach operation by railways upon competition and rates—one railway officer says, "By operating an entirely adequate service at reasonable rates, I believe that we have minimized competition. On one of our two routes, we have consistently made a profit, and on the other we have not, because of spasmodic price-cutting competition, which at the moment has disappeared."

Mr. Neff says, "We have not found that the operation of bus lines by our company has tended to drive out competitive bus lines; in fact, it has been our policy to work with them in a reasonable way to give the public any necessary transportation service. It is very difficult to maintain a level of rates among bus lines as many of them have not yet been willing to meet competitive conditions on the basis of service, and with a view of making a reasonable return on their investment. As a result, some of these lines are sold, change hands, or have to be refinanced, which is an economic waste, but it is difficult to control a new industry which has not yet, in many cases, found itself."

"The effect on competitive independent lines has differed with respect to intrastate and interstate routes," according to another railway officer. "In the case of intrastate lines, our entry into the field has had a tendency to drive out competitive lines and to maintain rates at a reasonable level. This has not applied, however, in the case of the interstate lines."

Mr. Turney says, "Railroad owned and operated motor coach lines, because of better organization, higher standards of equipment, maintenance and operation, adherence to a uniform schedule of charges and unquestioned responsibility, have been exceptionally successful

Pennsylvania Greyhound Motor Coaches Supplement Railway Trains

in meeting the competition of independent bus lines. In our own case they have gradually eliminated practically all of such competition."

Mr. Harding says, "So far as I am aware, the establishment of Southern Pacific bus lines did not drive out any competitive lines, practically all have been included in the merger out of which the Pacific Greyhound Lines developed. Competition of bus lines does tend to reduce rail rates, particularly on long-haul traffic where bus operators find it more profitable to adopt a rate basis of two cents per passenger mile than to encourage wildcat competition by charging fares comparable with the standard rail fare of 3.6 cents per passenger mile. A good example of this is the present transcontinental bus fare from San Francisco to Chicago of $39.50, or 1.8 cents per mile. The standard rail fare is $79.80, or 3.6 cents per mile, but to meet the bus competition a special rail coach fare of $40 is now in effect. Bus operators state that the present fare of $39.50 is remunerative and that charging any higher fare would immediately result in the establishment of additional bus lines by wildcat operators, which would eventually mean less traffic and less profit for the established operators."

With respect to rate competition, Mr. Haugh says, "It never has been the policy of the Union Pacific to drive out competitive bus lines. It has always been the policy to maintain fares at a reasonable level and never to engage in cut-rate practices. The Interstate Transit Lines and Union Pacific Stages are separate corporations, subsidiary to the Union Pacific, and are expected to operate on their merits and to earn a profit."

Future Developments

With respect to future developments in the operation of motor coach lines by railways—whether lines to be established will be supplementary and competitive with train service or in replacement of train service—one railway officer says, "There will be some development along the competitive line, but in our particular territory I believe the greatest development will be in the replacement of train service."

Mr. Neff says, with respect to this question, "The future development of motor coach lines, we think, will be along the same lines as in the past, namely, the performance of transportation service demanded by the public. There is a divided sentiment, of course, among the rail lines as to whether they should continue to maintain any passenger train service at a loss, but it is our view that the railroad is a public service institution which must necessarily perform some service at a loss, and that it should seek to do so at the least expense. The railroads and the bus lines have the same problems of securing patronage in competition with private automobiles. There is at present an admitted excess of bus transportation over the country as a whole, but it seems impractical to solve this problem until the Interstate Commerce Commission has been given jurisdiction over interstate operations. If and when this is done, I am satisfied there is sufficient demand for bus transportation to make it profitable, and I am equally sure that a railroad investment in bus lines to provide service at a lower cost can be justified many times over, even though the future of passenger transportation should be such that eventually it would be discontinued entirely in certain territories. The experience of every railroad, which has operated bus lines has been that they can earn 25 per cent or more on their investment through the substitution of buses for trains. When an investment can be liquidated in four years time, there should not be much hesitation in making it."

Another railway officer says, with respect to future developments on his line, "We have already paralleled all of our more important lines; therefore, the future development of such motor coach lines will, in my opinion, provide further replacement of train service rather than to supplement existing train service. In other words, the frequency of service now operated, train and bus, is, in my opinion, sufficient for the future, and if there is any further decline in traffic on trains, the logical thing to do will be to replace train schedules with bus schedules."

Mr. Turney says, "With the exception of branch line runs, which are operated solely to discharge a charter obligation to furnish service, in lieu of railroad train service, our bus lines are earning a fair return upon their investment. If consideration is given to the economies which they have enabled the railroad company to make, their profit becomes relatively very large. The future development of our motor coach lines will be toward the complete substitution of motor coaches for all local train service and also, to an increasingly large degree, for through day-coach train service."

Mr. Harding says, "Practically all of the Southern Pacific's rail lines are now paralleled by motor bus lines in which we have some interest, and there is little prospect that any new bus routes of importance will be established. It seems probable that motor bus development in the future will be supplementary to, rather than competitive with, train service."

In conclusion Mr. Haugh says, "The Union Pacific plans to confine its activities to its own territory and not to invade the territory of other railroads, excepting only in such cases where it is essential to keep its own route."

Why Shippers Use Trucks

(*Continued from page 487*)

of packing materials and at the same time may provide equal or better protection than the packing required by the railroads.

8. Store-door reconsignment without transfer.—The ability of a consignee to reconsign a shipment arriving at his store door, without the necessity of transfer from one vehicle to another, is of consequence to only a limited number of shippers in their choice of motor truck transportation.

A jobber, on receiving a shipment which is being delivered by motor truck from the manufacturer, can give the driver of the truck further delivery instructions for the entire truckload or a portion thereof. The driver then distributes the goods to the jobber's customers for a slight additional charge without transfer to another truck. This practice gives motor trucking an advantage over shipment via rail only when the rail shipment is by carload delivery to the consignee's siding and the local delivery haul is not performed by trucking service. Hence, this advantage as a factor in the situation is of only very limited consequence.

Some of the economic advantages which are involved in the ability of the consignee to reconsign without transfer are:

a. It eliminates rehandling over the consignee's platform.
b. It is a time-saving procedure, eliminating the necessity of arranging for other local cartage service.
c. It saves transportation expense because the intercity trucker will handle reconsignments for an additional charge

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which is considerably less than the charge for shipping by regular local cartage service.

9. Settlement of claims.—The factor which involves the promptness and sureness of claim settlements for loss or damage to goods in transit is of incidental consequence to a few shippers in their choice of truck transportation. The trucking companies, because of their direct contact with the shippers, settle all claims for loss and damage as soon as presented. The railroads, because of the size of their organizations and the formal procedure which they require to substantiate claims, consume an appreciable time before claims are settled. However, the great majority of shippers are completely satisfied with the prompt treatment which the railroads now give to this matter.

None of the shippers interviewed entertained any doubts as to their ability to collect reasonable claims from either the railroads or the trucking companies with whom they were doing business. The railroads pay all such claims as a matter of good business policy, and the trucking companies all carry insurance against loss or damage to goods in transit. Practically all shippers now require the trucking companies to furnish statements of the amount of insurance which they carry or investigate the matter on their own account before giving them any business. Therefore, this factor can be considered to have no consequence in the total situation.

10. Factors pertinent to the particular business involved.—A glance at the summary in Table I shows that there are characteristics peculiar to certain industries which have influenced a few shippers in their choice of truck transportation.

The use of motor trucks for making C.O.D. deliveries to small consumers who have no credit relations with the manufacturer is an interesting example of such a consideration in favor of truck shipping. The railroads, because of the nature of their operation, cannot undertake to perform such service for the shipper. Another example is the use of motor trucks for shipping carload lots to consignees without rail sidings, thus eliminating the necessity of trans-shipping to trucks for local delivery from the railhead.

Such factors pertinent to particular concerns might well be decisive ones for them in their choice of a transportation system. This fact is an argument in favor of having an industrial organization connected with the operation of any transportation system to work out means of satisfactorily serving the particular need of shippers.

Odds and Ends . . .

Side Lines

Always interested in what railway men do with their spare time, if any, we were intrigued to learn of two railroaders whose talents lie in the same unusual direction. Both of them are violin makers. Dan Waters, of Harvard, Ill., has been making fine violins for 40 years, during the odd moments when he was not running a locomotive. Archie L. Bohn, passenger brakeman on the Middle division of the Pennsylvania at Altoona, Pa., has made many stringed instruments of various kinds, including more than 100 violins.

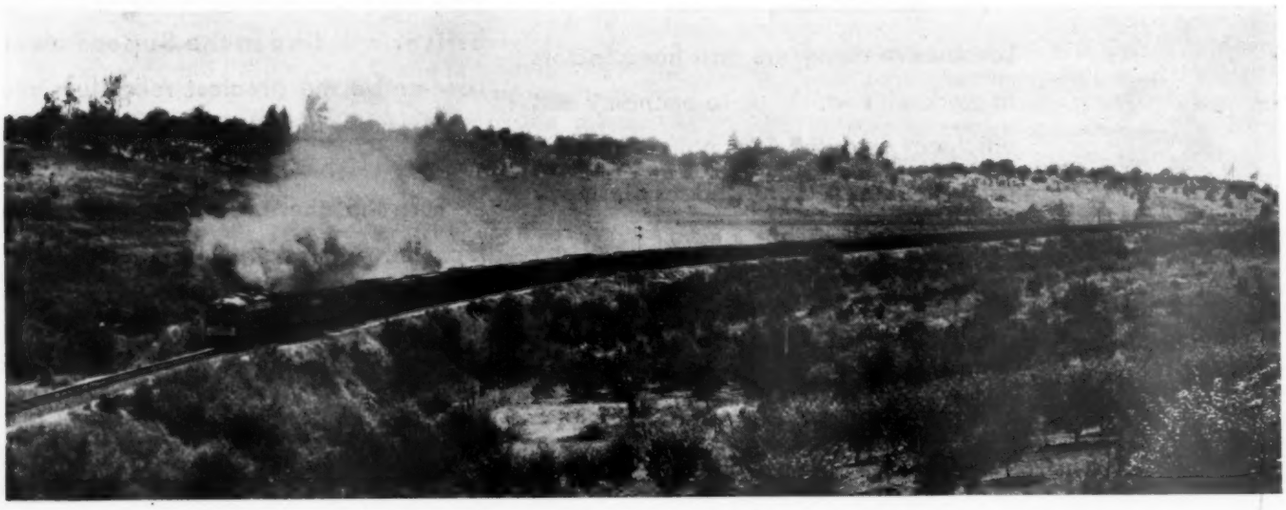
An All-Indian Band

One of the outstanding features of Los Angeles' celebration of its one hundred and fiftieth anniversary was the all-Indian band from Winslow, Ariz. Famous throughout Arizona and New Mexico, the band is also an all-Santa Fe organization since the members without exception are employees of the Santa Fe in occupations ranging from coach cleaner to mechanic in the shops. The band had its inception eight years ago and has progressed steadily since that time. There are now 25 members representing full-blooded Indians from 11 separate tribes.

A Record Load of Lumber

The lumber business may be a little slow just now, but the Southern Pacific recently moved the largest trainload of lumber in its history from Northern California to Ogden, Utah, on its way to eastern destinations. It was a 117-car trainload of lumber, containing more than 3,000,000 ft. of redwood. Advertised as the Redwood Empire Special, the huge train left Sacramento, Cal., under auspicious circumstances, with Governor James Rolph, Jr., of California, and other dignitaries officiating in the attendant ceremonies. The special was routed over the Southern Pacific to Ogden, thence over the Union Pacific, the Chicago & North Western, the Pennsylvania, and the Boston & Maine to eastern points.

Plans for the record-breaking trainload were conceived when lumber mills of Northern California received an unusual number of orders for carload and half-carload shipments, these originating in all parts of the country. The lumber men decided to pool their shipments and create a "prosperity special." Thousands of workmen labored day and night for several weeks in the redwood country of Northern California counties in order to insure the success of the plan. The enterprise and resource of the lumbermen was matched by the Southern Pacific which took the heavy train over the 7,000-ft. "hill" represented by the Sierras and brought it into Ogden exactly on schedule.



The Redwood Empire Special Starting Its Climb Over the Sierras

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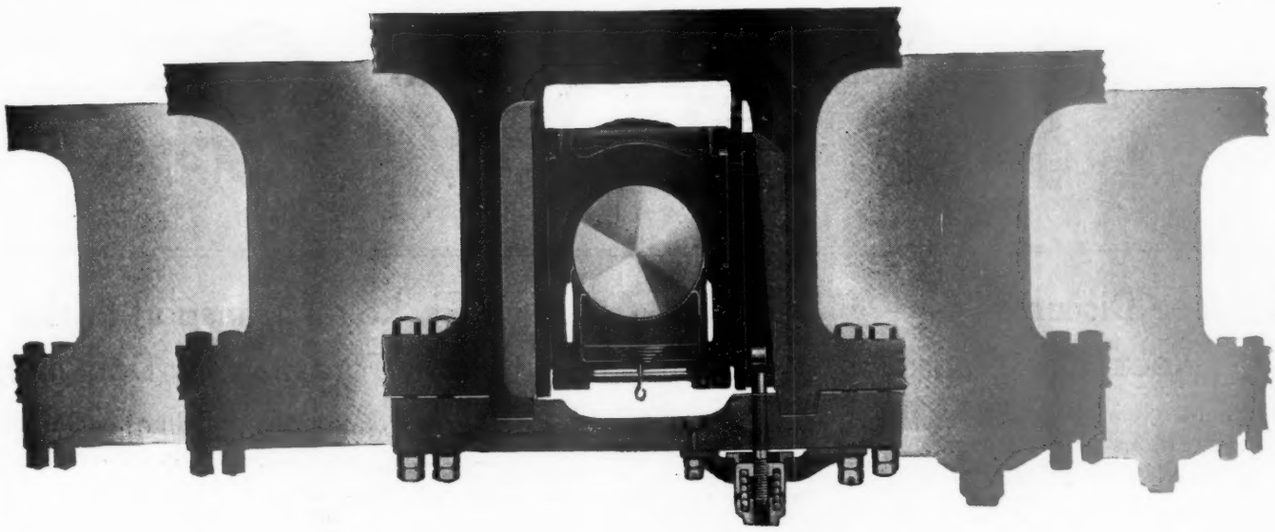

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NEWS

Bledsoe Discusses Recapture Clauses

Santa Fe chairman advances five suggestions for maintenance of adequate rail service

A requirement that each carrier earning in any year in excess of six per cent on its property investment shall place one-half of such excess in a reserve fund to be established and maintained by such carrier for paying interest on bonds, other fixed charges and dividends on common stock, as may be necessary, in any year in which net railway operating income is less than six per cent on its property investment, was recommended by S. T. Bledsoe, chairman of the executive committee and general counsel of the Atchison, Topeka & Santa Fe, as a substitute for the recapture provisions of the Interstate Commerce act, in an address before the annual meeting of the Savings Bank Association of the State of New York at Niagara Falls on September 18. Mr. Bledsoe also recommended co-ordination of all transportation facilities, and that railroads be authorized to engage in motor, highway, water and air transportation on equal terms with others.

He also suggested that in order to maintain adequate railroad service and establish equality of treatment of all shippers, passengers and transportation agencies, there should be:

1. An adjustment in railroad rates to enable the carriers in prosperous years to pay operating expenses, taxes, fixed charges and reasonable dividends and accumulate a reasonable reserve for lean years, so as not to be compelled to seek rate increases during periods of depression.

2. Reasonable, just and constructive regulation of the rates, practices, accounting, responsibility and service of all operators of motor buses and motor trucks operating on the highways for profit and the imposition of a fair charge for use of the highways by such buses and trucks.

3. Regulation of intercoastal and inland waterways traffic by the Interstate Commerce Commission, with non-discriminatory rates, practices and service requirements.

4. Removal of all restrictions on railroads competing for intercoastal traffic through the Panama Canal.

5. Discontinuance of competition by the United States with railroads, and of the subsidizing, directly or indirectly, of other forms of transportation.

"In discussing the plight of the railroads it sometimes seems as though the popular assumption was that a large part of the freight traffic lost has been permanently taken away by other forms of transportation, mostly by motor trucks. Probably nothing is further from the truth. We hear nothing of declining truck traffic, probably for the simple reason that there are no published figures, as there are on railroad loadings. But if the motor-freight business has not declined together with the decline in car loadings, why the current low level of motor truck output, which in July, allowing for seasonal variation, amounted to about half the peak volume of 1929? And if the current receivership prices of some railroad bonds are to be accounted for by a permanent loss of freight traffic to the motor truck, how are we to account for the present low prices for Mack Trucks and other leading motor shares? Some observers are so aghast at the sight of motor carriers hauling large loads of automobiles that they are unable to comprehend the simple fact that automobiles are still being shipped by rail, as any one can see for one's self by going to the nearest freight yard."

—D. W. Ellsworth in the N. Y. Times Annalist.

Citrus Fruit Rates From Florida Held Reasonable

The Interstate Commerce Commission has issued a decision finding that rates on citrus fruits from Florida producing points to destinations in states east of the Mississippi river are not unreasonable or otherwise unlawful and dismissing a complaint filed by Southern Fruit Distributors, Inc., and others.

Oil Rates Effective December 3

The Interstate Commerce Commission has announced that the railroads will be expected to put into effect on December 3 all rates included in its general revision of freight rates on petroleum and products under the Hoch-Smith resolution. On petition of the eastern roads the date had been postponed from October 15 but the southern and southwestern lines asked for a further postponement to January 15.

Royal Transport Probe Foreseen for Dominion

Premier Bennett will name illustrious group to find answer to competition's problems

Premier Bennett of Canada hopes to be able to appoint within the next few weeks a Royal Commission to make a comprehensive study of the transportation situation throughout Canada. Illustrious names are among those who are likely to be appointed to this body, the work of which may prove the most thoroughgoing and important inquiry of like nature which has occurred since the establishment of the Dominion.

The railways are suffering heavily and increasingly from the present depression. In a measure to offset this danger, the executives of the two principal railways, along with other operating economies, are making a determined and joint effort to reduce expenses by eliminating costly competitive practices. It is hoped, however, that even greater savings may be achieved. The matter of bus and truck transport, also, will be considered by the commission in the light of its effect on the railways, which are being subjected to unfair competition from this quarter.

Consideration of a readjustment in the financial composition of the Canadian National will, in all probability, also come under review. This system is still doing business with a capital structure inherited from war times and entirely divorced from reality. In spite of this fact, however, the government road, by reason of the fact that new issues of securities are guaranteed by the Dominion, is placed at a decided advantage over its private competitor, the Canadian Pacific, when it enters the market for funds for equipment or other capital purposes.

It is believed that the Royal Commission will be made up of seven members, among whom will be E. W. Beatty and Sir Henry Thornton, who occupy the presidency and chairmanship, respectively, of the Canadian Pacific and Canadian National. A leading financier from Great Britain, one from the United States and two or three prominent business and financial men from Canada will complete this membership. The Commission will be expected to consider the interests of the carrier, the shipper and the investor—not as mutual opponents, but as co-operators on a ground of harmony. It is not believed, however, that anything so drastic as an amalgamation of the two roads

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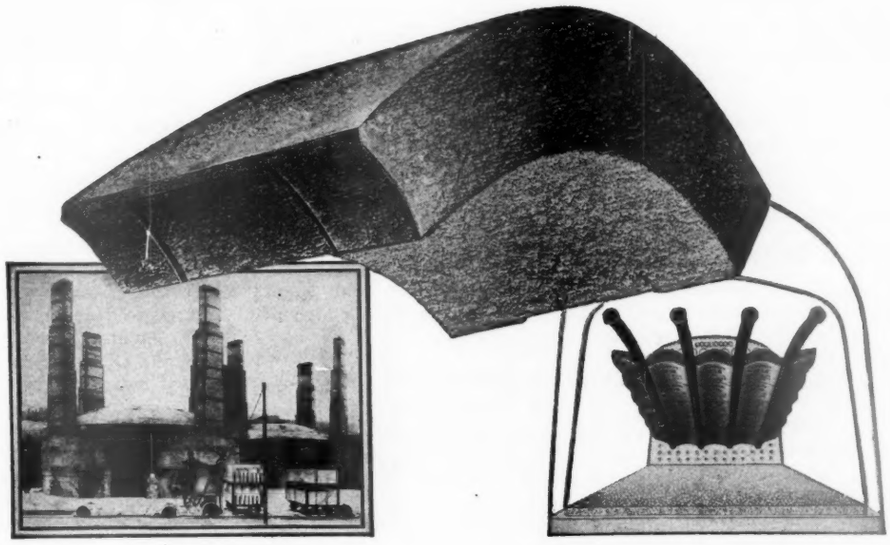

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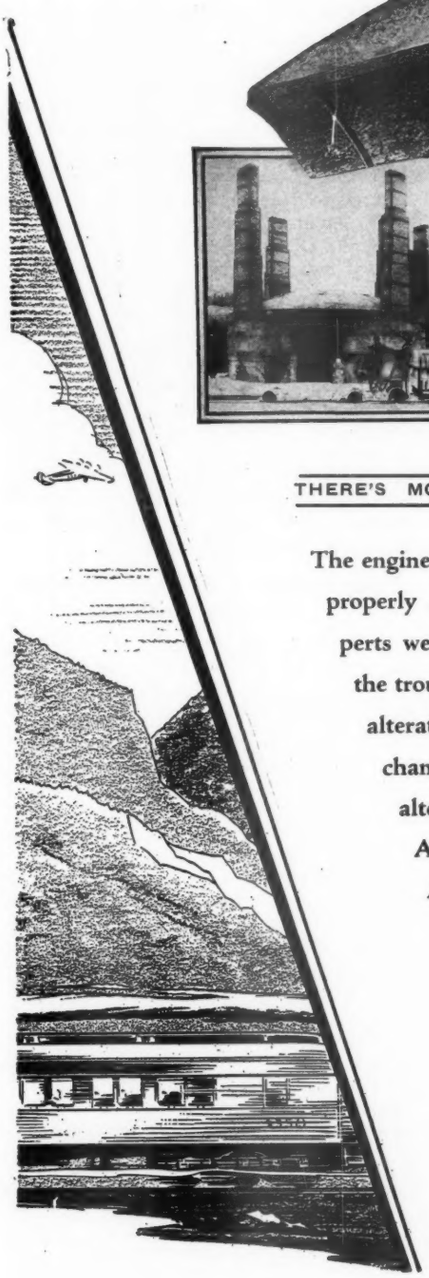

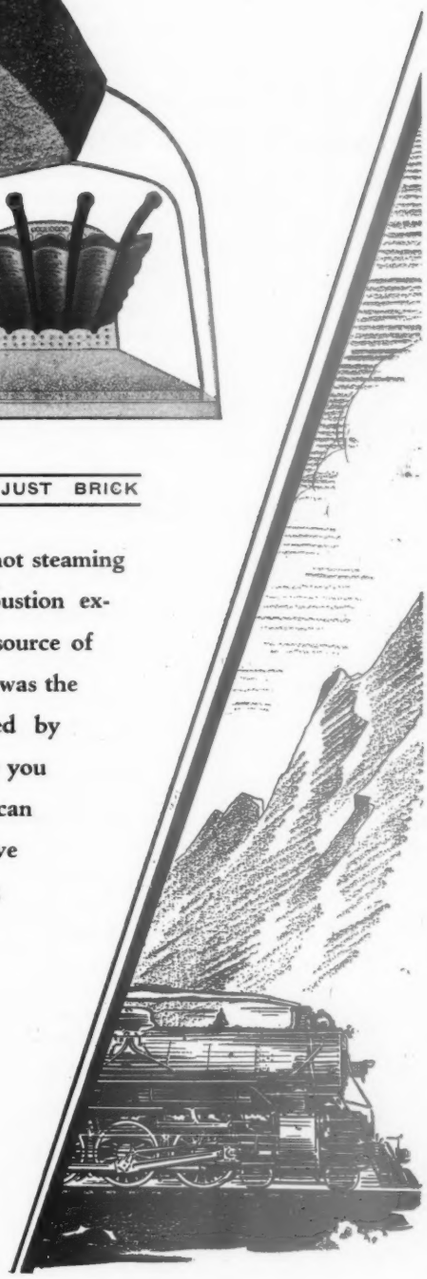

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will be advocated, in view of the fact that this issue has never been carried to the Canadian people at an election.

Thoroughgoing examination of the duplication of facilities and services is expected, however, since experts have estimated that nearly $25,000,000 annually can be saved by elimination of such competition. As Minister of Finance, Premier Bennett has had to concern himself with the financial difficulties of the Canadian National. He does not feel alarmed, however, for in his canvass of this situation he has encountered a high spirit of co-operation on the part of the railways, the shippers and the public. From this spirit, he feels, a solution of the problem must come, once it is thoroughly surveyed by competent, public-minded men.

Speakers for R. B. A. Dinner

The speakers at the Railway Business Association annual dinner on November 4 at Chicago are to be Col. R. Isham Randolph, president, Chicago Association of Commerce, greeting; Paul Shoup, President, Southern Pacific, "Our Railways"; Thomas F. Woodlock, former Interstate Commerce Commissioner, now contributing editor, Wall Street Journal, "Ninety Seven Varieties of Star Spangled Communism"; George E. Vincent, late President, Rockefeller Foundation, "As Others See Us" ("others" met in a world tour 1930-'31).

Three Miles a Minute

"Three Miles a Minute" is the heading, not of an account of a race, but of a formal announcement, in New York newspapers, of a regular passenger service, by airplane, recently inaugurated between Newark, N. J., and Washington, D. C., by the Ludington Lines, which operate passenger planes between Newark and Washington daily, every hour all day, with stops at Philadelphia and Baltimore. The new fast planes are scheduled to fly without a stop to Washington (about 220 miles by rail) in 68 minutes. They leave Newark at 9:40 a.m. and 4:40 p.m., Eastern time, and the fare is $16 one way.

How Steel Companies Can Sell Rails

F. J. Lisman, banker and student of railway affairs, has suggested a method whereby the steel companies can stimulate their production to their own benefit and that of the railroads. This suggestion, designed to promote employment both on the railways and in the steel mills, reads as follows:

"The railroads have no money but require certain materials; for example, rails. The steel companies have no orders but are in a strong financial position. These two interests might supplement each other with the greatest of ease and thus furnish employment to thousands of men which would help all around.

"The steel companies could supply the railroads with the required amount of rails, to be paid for more or less on the instalment plan very much like equipment notes. The title to the rails would necessarily pass under the railroad companies' mortgages at once and the transactions could not be financed by the sale of securities to the public, but the steel companies could very well afford to do this themselves."

New England Shippers' Board

The New England Shippers' Advisory Board held its regular meeting at New London, Conn., on September 18. The summary of commodity reports shows a probable decrease of 4.9 per cent in the volume of freight to be moved in the third quarter of 1931, as compared with the movement one year ago. This decrease is not so great as that for the preceding seven months of this year, indicating that the rate of business decline is slowing up. While in many important commodities the committee predicts decreases, there are expected increases of five per cent in grain, live stock, packing house products, petroleum and sugar; and of 10 per cent in automobiles, chemicals and woolen goods.

Roosevelt Confers with Bankers on Railroad Bonds

At the invitation of Governor Franklin D. Roosevelt of New York, the State Superintendent of Banks (J. A. Broderick) and the chairman of the joint legislative banking committee (N. W. Cheney) conferred with the Governor and a number of leading savings bankers in Albany on November 19 to consider the advisability of legislation relative to railroad bonds as savings bank investments. It was the unanimous opinion that no legislation was necessary at this time, but if it was warranted, legislation on this subject would receive the favorable consideration of the Governor and the legislative leaders at the coming regular legislative session.

Western Railway Club to Hear About Patents

At the initial fall meeting of the Western Railway Club, scheduled to be held at the Hotel Sherman, Chicago, on October 19, the subject, "Patents and Railway Progress," will be presented by Charles L. Howard, assistant general counsel of the Western Railroad Association. Mr. Howard will describe the origin of patent laws and tell of early railway patents of unusual interest, devoting particular attention to such items as patentability, infringements, expired patents, the manufacture of repair parts for patented devices, patents granted to railway employees and the service afforded by the Western Railroad Association in connection with the railroads' use of patented articles.

C. P. R. Closes Angus Shops

The Canadian Pacific last week announced that the Angus shops at Montreal and the Weston yards at Winnipeg would be closed until further notice.

A brief official statement issued by Vice-President Grant Hall announced the indefinite suspension of work on the yards which have been running on short time over a prolonged period. Some 5,000 to 6,000 men are normally employed at the two points, about 3,000 at the Angus shops and between 2,000 and 3,000 at Weston. These men have been on part time for a long period. The company's program of building engines and cars, it is said has been completed, that portion of the $11,000,000 relief fund ear-marked for production of equipment having been spent.

A further 1100 men have been furloughed from the Ogden shops in Calgary and 400 more from the Coquitlam shops at Vancouver.

Central Western Shippers' Board

The regular meeting of the Central Western Shippers' Advisory Board will be held at Cheyenne, Wyo., on September 29. A. H. Marble, president of the Stock Growers' National Bank, Cheyenne, will speak on Financing Livestock Producers During Drought Periods; J. E. Brock, president of the Wyoming Stock Growers' Association, will talk on the Necessity for Saving Breeding Stock During Drought Periods, and Fred Winburn, special representative of the freight claim division of the American Railway Association, will speak on Freight Claim Prevention. At a luncheon on the same day, the main speaker will be Governor A. M. Clark of Wyoming. C. N. Arnett, president of the Intermountain Livestock Marketing Association, will talk on Efficiency in Livestock Marketing Methods, and G. L. Whipple, general superintendent of transportation of the Union Pacific, will speak on Efficiency and Economy in Railroad Operation.

Track Supply Association Discusses Railway Crisis

The Track Supply Association held a meeting at the Auditorium Hotel, Chicago, on September 22, at which a number of railway officers were present, for the purpose of discussing ways in which this association could be of assistance to the railways in meeting the conditions imposed by the present crisis. The tentative draft of a resolution, directing attention to the primary causes of the current predicament of the railways, was offered for discussion and upon invitation, comments were made by R. H. Ford, assistant chief engineer, Chicago, Rock Island & Pacific; C. T. Dike, chief engineer, Chicago & North Western; T. J. Thomas, assistant to president, Chicago, Burlington & Quincy; F. H. Johnson, assistant to president, Chicago, Milwaukee, St. Paul & Pacific; Lem Adams, engineer maintenance of way, Union Pacific System, and R. V. Fletcher, vice-president and general counsel, Illinois Central. The resolution will be submitted to the membership of the association by letter ballot and efforts will be made to enlist the co-operation of other associations of railway supply manufacturers.

Pork and Perishable Freight

Fresh pork should be billed as fresh pork, not fresh meat. This is a kind of meat which in hot weather is kept in good condition only with extreme difficulty, and the bill clerk should take care to see that no one makes a mistake as to the contents of such a package.

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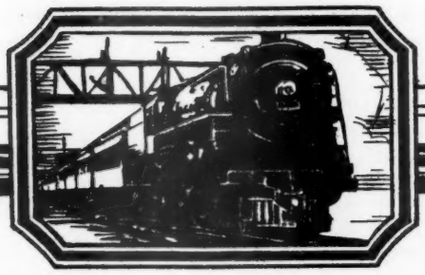

Alco Alco

TO ECONOMIZE— MODERNIZE

"Will the railroads continue to allow the proportion of new locomotives to decrease, while the designers continue to pile up improvements adapted to meet conditions which the railroads are facing in acute form today?

When the demands of a rapidly increasing traffic were constantly forcing the railroads to provide additional facilities, the value of a locomotive was measured in terms of the gross revenue which would be lost were it not available. Today the value of a new locomotive is measured in terms of its ability to perform more cheaply and more effectively a service already provided for. Its determination involves measuring the obsolescence of the old. A negative attitude toward obsolescence must be replaced by a positive attitude—one which places the burden of proof on the old locomotives and constantly subjects their performance to a critical examination in view of the possibilities offered by current developments in locomotive design. Only in this way will the active locomotives of tomorrow be fitted to provide the quality of service demanded by the public at a cost satisfactory to the railroads."

From an editorial in the Railway Age
June 20th, 1931

American Locomotive Company
30 Church Street New York N.Y.

Alco Alco

This is one of the points of interest in a circular issued to freight station employees by V. C. Palmer, superintendent of freight claim prevention of the Grand Trunk (Detroit). Mr. Palmer is continuing his campaign to reduce loss and damage on freight to one-half of one per cent of the gross revenue, with the slogan "IT CAN BE DONE." For the first six months of 1931, the road has brought the figure down to 0.65 per cent, a considerable reduction from the year 1930.

Other points in connection with perishable freight are: (1) The necessity of keeping ice plugs out no longer than is absolutely necessary; if, after the plug is out, men are slow in putting in the ice, the car tends to warm up, and at the next checking point there is a mystery as to why there is so little ice; (2) employees should never report an ice bunker as, for instance, "seven-eighths full," unless the ice is first tamped down.

Club Meetings

The Car Foremen's Association of Omaha, etc., will hold its next meeting at the C. B. & Q. passenger station, Omaha, Neb., on Thursday, October 8, at 2 p. m. J. F. Barrett (Missouri Pacific) will speak on inspection of cars and supervision.

The Eastern Car Foremen's Association will hold its next meeting at 29 West Thirty-ninth Street, New York City, on Friday evening, October 23. G. W. Doak will present a paper on chilled iron car wheels, illustrated by motion pictures.

The New England Railroad Club will hold its next meeting at the Copley Plaza hotel, Boston, on Tuesday, October 13, at 6:30 p.m. The speaker will be T. N. Perkins, chairman of the board of directors of the Boston & Maine.

The Indianapolis Car Inspection Association will hold its next meeting on Monday, October 5, at 7 p.m. at Hotel Severin, Indianapolis, Ind. L. C. McNamara will speak on journal box packing and renovated dope.

The Cleveland Railway Club will hold its next meeting at the Brotherhood of Railroad Trainmen's Building, Cleveland, on Monday evening, October 12. The discussion will be on airbrakes.

Proposed Unification of Portland Switching

A plan for the unification of terminal switching operations in Portland, Ore., whereby the city and each of the railroads will be represented on the board of control that would operate the proposed switching company, has been proposed by a committee consisting of representatives of the city, the dock commission, the Port of Portland and others. The interests which would have representatives on the board of control include the city, the Northern Pacific, the Union Pacific, the Southern Pacific, the Great Northern, the Northern Pacific Terminal Company, the Spokane, Portland & Seattle, the United Railways, the Oregon Electric and the Pacific Northwest Public Service Company. Under the plan the city would own the break-up yards in North Portland and the link in the belt line along the water front from Jefferson to Glisan street. All tracks, rolling stock and other equipment needed by the switching association would be leased to it by the several railroads. It is proposed that each of the participating companies advance the switching company $10,000 as working capital and bear the cost of operation of the service; this to include interest and amortization of the bonds issued by the city to provide the break-up yards and the belt line link.

A New York Central Centenary

September 24, 1831, was the day on which regular passenger trains began running on the Mohawk & Hudson, now a part of the New York Central; and the event was celebrated in Schenectady, N. Y., on Thursday of this week by a dinner, given by the Schenectady Chamber of Commerce and the New York State Historical Society. Among those present were six vice-presidents of the New York Central, the acting governor of the state and distinguished citizens of Schenectady. The General Electric Company took an active part in the celebration, and two small model trains, one a replica of the DeWitt Clinton the historic locomotive, the performance of which was being celebrated (the first train to be operated in the State of New York), and one of a modern electric locomotive, were started by the recently developed electrical apparatus which is controlled wholly by the sound of the human voice. R. D. Starbuck, vice-president of the New York Central, speaking a word into a telephone, caused the miniature train to emerge from a train shed at one end of the speakers' table.

The hundredth anniversary of the granting of the charter to the Mohawk & Hudson was celebrated in Schenectady on April 17, 1926, as noticed in the *Railway Age* of April 24, of that year, page 1153.

The New York Evening Post, reprinting from its files of 1831, notes that the members of the Common Council (September 21) "are going to visit the Mohawk & Hudson Railroad to inform themselves by personal inspection as to the practicability of constructing such a work without obstruction to the passage of ordinary vehicles;" this in order to be able to vote advisedly on a pending application of the New York & Harlem. [The New York & Harlem laid tracks in Fourth avenue and connecting streets as far south as Center street, near the City Hall.]

Central of New Jersey Wins First Place in Smoke Abatement

The Department of Smoke Regulation, Board of Health and Vital Statistics of Hudson county, New Jersey, reports that the Central of New Jersey received the highest rating in its campaign to abate smoke during the month of June. The comparative standings of the nine roads operating through Hudson county are shown in the table. The column headed "No." shows the number of readings taken during the month on each road for each class of service. Under the heading "Avg." is shown the average smoke density of all the readings taken. The road with the lowest average for the month is placed at the top of the list. Similar readings taken for the month of May show an average density of 23.5 compared to a Ringlemann's chart. The month of June shows an improvement of 10 per cent.

LOCOMOTIVE SMOKE PERFORMANCE FOR HUDSON COUNTY, N. J., FOR THE MONTH OF JUNE, 1931

	Passenger		Freight		Switching		Average		
Railroad	No.	Avg.	No.	Avg.	No.	Avg.	No.	Avg.	
C. of N. J.	145	9.7	43	11.5	43	4.1	231	9.0	1
Pennsylvania	120	15.6	38	19.3	34	3.7	192	14.3	2
Reading	24	17.5	7	16.1	..	...	31	17.2	3
Lehigh Valley	8	20.1	8	31.5	8	18.5	24	23.4	4
D. L. & W.	37	33.9	23	23.5	36	18.3	96	25.5	5
Erie	169	32.7	24	29.6	31	28.4	224	31.7	6
N. Y. C.	30	39.6	8	41.5	16	28.5	54	36.6	7
N. Y. O. & W.	6	49.5	4	24.0	1	11.1	11	36.7	8
B. & O.	18	39.1	2	16.7	..	...	20	36.9	9
Total	557	23.0	157	21.1	169	14.6	883	21.1	

Mechanical Meetings to be Consolidated

In order to discuss plans for future annual meetings, the American Railway Association, Mechanical Division, Subcommittee on Consolidation of Mechanical Conventions, held a joint meeting on September 14 at Chicago, with representatives of the following associations: Air Brake, American Railway Tool Foremen's, Association of Railway Electrical Engineers, Car Department Officers', Equipment Painting Section, International Railroad Master Blacksmiths', International Railway Fuel, International Railway General Foremen's, Master Boiler Makers', Traveling Engineers' and Allied Railway Supply. The subcommittee, representing the General Committee of the Mechanical Division, included John Purcell, assistant to the vice-president, Atchison, Topeka & Santa Fe, who presided; E. B. Hall, general superintendent of motive power and machinery, Chicago & North Western; F. R. Mays, general superintendent of motive power, Illinois Central, and V. R. Hawthorne, secretary, Mechanical Division. The various associations were represented by their respective presidents and secretaries, other officers being present in a few instances.

After a general and complete discussion of the problems involved, it was unanimously decided that none of the associations represented would have any exhibit of railway appliances and equipment during the year 1932.

It was decided that the general plan of consolidated meeting arrangements, as proposed by the Mechanical Division, be adopted, with the understanding that the duration of meetings and arrangement of groups might be modified. This general plan, as covered in a report dated May 23, 1931, to the General Committee, suggested that in the interests of economy, all meetings be held during one week early in May (the first or second week), the following associations shown in Group I meeting during the first three days of the week, and the associations in Group II during the last three days:

Group No. 1—International Railway General Foremen's Association; Traveling Engineers' Association; The Air

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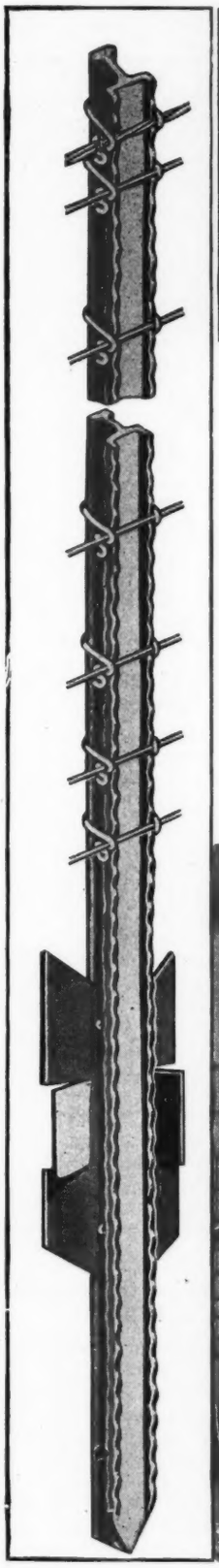
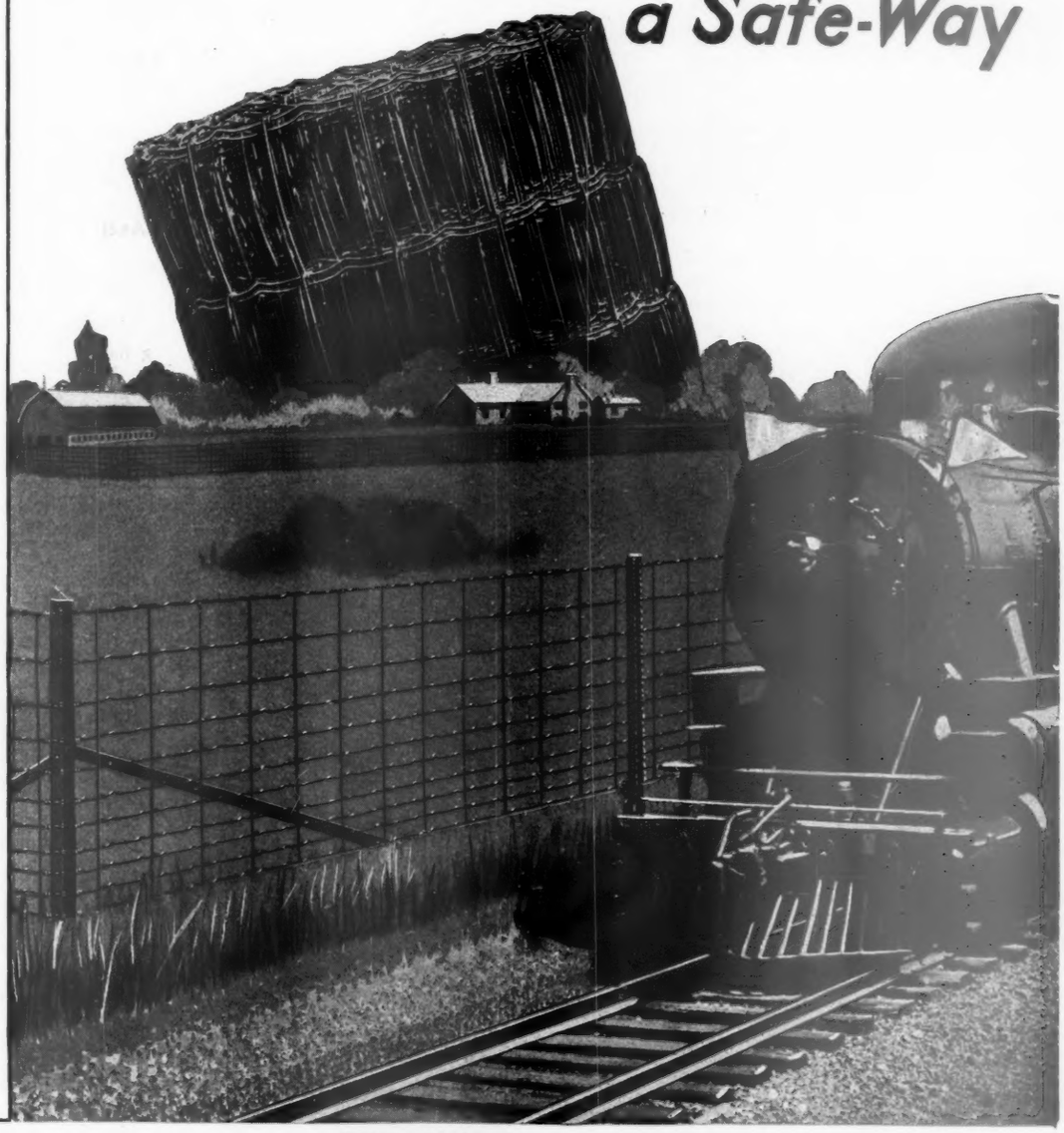


AMERICAN Fence and BANNER STEEL POSTS

IT is cheaper to put up a good fence than to pay stock claims. Likewise it is economy to buy adequate protection—proved protection—such as that offered by American Railroad Fence and Banner Steel Line Posts—the post of railroad rail construction. These products including National Expanding Anchor End and Corner Posts meet every specification recommended by the American Railway Engineering Association.

Make Your Right-of-Way - - a Safe-Way



1831 COMMEMORATING AMERICAN STEEL & WIRE COMPANY 100 YEARS of PROGRESS IN WIRE MAKING 1931

AMERICAN STEEL & WIRE COMPANY

208 South La Salle Street, Chicago SUBSIDIARY OF UNITED STATES STEEL CORPORATION And All Principal Cities

Pacific Coast Distributors: Columbia Steel Company, Russ Building, San Francisco *Export Distributors:* United States Steel Products Company, New York

Brake Association; American Railway Tool Foremen's Association, and International Railway Fuel Association.

Group No. 2—International Railroad Master Blacksmiths' Association; Car Department Officers' Association; Master Boiler Makers' Association; Association of Railway Electrical Engineers, and A. R. A. Equipment Painting Section.

Discussion at the meeting on September 14 indicated that it might be desirable to modify this grouping of associations in some instances and possibly facilitate the handling of registrations and other details by arranging for the associations in Group I to meet during the last three days of one week and Group II during the first three days of the following week. The desirability of each association's maintaining its identity and meeting in separate rooms of some hotel which can accommodate a general exhibition of railway equipment and supplies was emphasized.

It was decided upon motion that a committee be appointed, consisting of one representative from each association, to work with the subcommittee of the Mechanical Division on the details of this arrangement, each representative to be given full power to act for his association.

The representatives of the Association of Railway Electrical Engineers voted in the negative on this proposition, stating that in their opinion their assocation should convene with the Electrical Section of the Engineering Division, American Railway Association, rather than with the other organizations covered in this general plan.

Trans-Missouri-Kansas Shippers' Board

According to commodity committees reporting at a meeting of the Trans-Missouri-Kansas Shippers' Board at St. Louis, Mo., on September 16, shipments from that territory during the fourth quarter of 1931 will be 5.7 per cent less than in the corresponding period of 1930. Among the commodities for which substantial increases are predicted are livestock, 9.7 per cent; dairy products, 5.9 per cent; eggs, 9.2 per cent; fresh vegetables, 5.3 per cent; grain, 4.5 per cent; petroleum and products, 2 per cent, and potatoes, 80 per cent. Decreases predicted include products of mines, 5.9 per cent; building materials, 15.9 per cent; automobiles, 12.9 per cent; agricultural implements, 37.4 per cent, and boilers and machinery, 61.1 per cent.

William H. Williams, president of the Wabash, addressed the meeting on the railroad situation, stating that the carriers are now spending much less for maintenance, but that there is no remedy except to increase rates or decrease costs. The application of the railroads for a 15 per cent rate increase, now pending before the Interstate Commerce Commission, is an indispensable step toward a more nearly balanced budget. The railroads, he added are not asking for an increase sufficient to make them prosperous but only enough to preserve their solvency. While labor costs remain at the present level, Mr. Williams said, the railroads have reached the limit in operating economies within their control; but there is a substantial operating cost which shippers can help reduce by loading freight cars to capacity. The average capacity of freight cars has increased from 42.9 tons in 1920 to 46.6 tons in 1930, but during the same period, the average actual loading per car has decreased from 26.71 tons to 24.52 tons. Transportation as a whole is bearing the added cost of underloading, which only the shippers can control. The additional cost of transportation, due to underloading, is at least equal to the wages of the entire engine and train crew of every freight train.

International Railway Congress at Cairo in 1933

The next International Railway Congress will be held at Cairo, Egypt, in 1933. Reports and reporters for America will be as follows:

The Protection of Level Crossings in View of Modern Developments in Road Traffic—A. Newlands, chief engineer, London, Midland & Scottish of Great Britain, Euston Station, London, N. W., England.

The Use of Mechanical Appliances in Permanent Way Maintenance and in Track Relaying—F. M. Thomson, district engineer, Missouri-Kansas-Texas Lines, Denison, Tex.

The Relationship Between the Vehicle and the Track, to Ensure Safety at High Speeds—Dr. S. Okhodo, director of the Bureau of Maintenance and Improvement; Dr. S. Matsunawa, chief of the Railway Research Office, and Dr. K. Asakura, chief of the rolling-stock section: all three of the Department of Railways, Government of Japan, Tokyo.

Methods to be Used to Increase the Mileage Run by Locomotives between Two Repairs, Including Lifting—Sir Henry Fowler, K.B.E., assistant to vice-president for works, London, Midland & Scottish of Great Britain, Derby, England.

Electrification of Railways from an Economic Point of View. Selection of Sites for Generating Stations. Choice of the Kind of Current. Safety Precautions, etc.—S. Withington, electrical engineer, New York, New Haven & Hartford, New Haven, Conn.

All-Metal Rolling Stock. Use of Light Metals and Alloys. Use of Autogenous Welding—H. N. Gresley, C.B.E., chief mechanical engineer, London & North Eastern of Great Britain, King's Cross Station, London, N. 1.

Allocation of Freight Rolling Stock. Investigation into the Turn-Around of Freight Equipment. Separation of the Elements Included in It. Methods of Reducing the Period of Turn-Around—F. H. van Rijckevorsel, ingenieur, chef de service des transports, Netherlands Railways, Maliesingel, 76, Utrecht, Holland.

Organization for Carrying Small Consignments of Goods and the Most Suitable Methods for Their Delivery with the Least Delay. Use and Selection of Fixed and Mechanical Transhipping Plants—M. Hauterre, chef de l'Exploitation Adjoint, French State Railways, 13 rue d'Amsterdam, Paris, France, and M. Mermont, inspecteur general du mouvement, Eastern of France, 13 rue d'Alsace, Paris.

Automatic Train Control and Train Stop. Track Equipment. Locomotive Fittings. Methods Used for Repeating Signals on the Locomotives. Devices Intended to Ensure the Attention of the Drivers—G. H. Crook, assistant to signal engineer, Great Western of Great Britain, Reading, England.

Competition between or Joint Working of Railways and Airways, or Railways and Roadways—E. C. Cox, traffic manager, Southern of Great Britain, Waterloo Station, London, S. E. 1.

Use of Rail Motor Cars on Secondary Railway Lines—A. D. J. Forster, assistant railway commissioner, New South Wales, Government Railways, Sydney, Australia.

Mobile & Ohio Clerks on Five-Day Week

Under the terms of an agreement between the Brotherhood of Railway Clerks and the Mobile & Ohio, a five-day week with five and a half days' pay will be put into effect throughout the system on October 1. The agreement carries no reduction in the prevailing rate of pay and is to be effective until March 31, 1932.

Foreign

Great Western Completes A. T. C.

The Great Western of Great Britain has completed its extensive installation of automatic train control, authorized last year (*Railway Age*, November 29, 1930), and involving a total of 2,130 miles of track and 2,500 locomotives. The entire cost of this enterprise is given as £250,000 (or something under $600 per mile of track).

By this improvement, the cab signal system, which was first introduced on the Great Western over 20 years ago, has now become automatic train control, and covers the lines of the company from London to Wolverhampton, Swansea and Plymouth, together with numerous diverging lines.

The apparatus of this system was described in the *Railway Age* of January 17, 1931. It is an electrical contact system, the ramp being in the middle of the track. Audible signals are included; a siren for caution and a bell for proceed.

Electrification Program—Swedish State Railways

The complete electrification of the Stockholm-Malmo line of the Swedish State Railways will be finished within the year 1933, according to a statement by Axel Granholm, director-general, in a recent lecture before a society of engineers at Malmo. This stretch is 371 miles long, while the already electrified cross-country line from Stockholm to Gothenburg has a length of 283 miles.

Mr. Granholm also hopes for the future electrification of the west coast railway, Gothenburg to Malmo, 185 miles, and of the Norrland line from Stockholm to Ange, 382 miles. The cost of electrification of the two last mentioned stretches, including locomotives, would require a sum of $21,384,000. The director-general pointed out that electrification will be of great importance to the national life and commerce of Sweden, by reducing time of transit, welding together the different distant parts of the country and stimulating trade.

Western Australian Government Railways in 1930-31

Drastic operating economies, including a reduction of 1,568 or 16.23 per cent in the average number of employees, enabled the Western Australian Government Railways to hold its deficit after interest charges to $1,850,561 for the year ending June 30, 1931, as against a 1929-30 deficit of $1,969,861. Operating revenues during 1930-31 were $15,578,706, a decline of $2,241,613 or 12.58 per cent from the previous year; operating expenses were at the same time cut $2,445,013 or 16.13 per cent to produce a net revenue of $2,863,920, an increase of $203,400 over the 1929-30 net of $2,660,520.

The 1930-31 fiscal period is the first of the past seven in which there has been a decline in operating expenses as compared with the previous year. They

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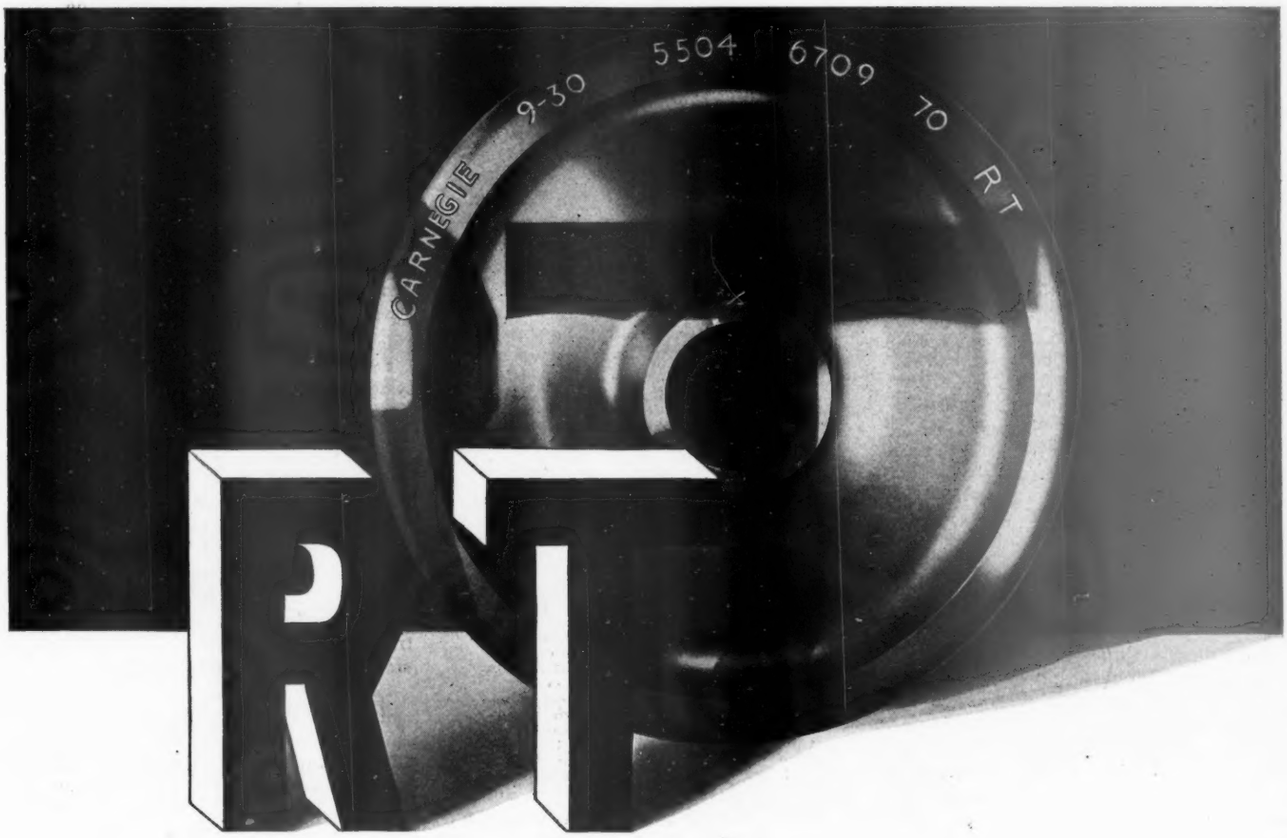

The MARK of EXTRA SERVICE

STAMPED on Carnegie Wrought Steel Wheels, the initials "R T" (Rim Toughened) identify wheels particularly adapted to modern heavy-duty service—wheels that will give you greater service, greater safety, greater economy. These initials indicate the additional refinement of heat treatment, the process of which produces a wheel with an especially tough rim and with high physical properties—a wheel that has been demanded by, and made especially for the ever-increasing weight and speed of modern transportation. Accurate machining insures perfect rotundity with a consequent increase in riding comfort.

Carnegie Rim-Toughened Wrought Steel Wheels are furnished for passenger, engine truck and tender service. Carnegie Light Weight Freight Car Wheels, rim-toughened, are also available for 70-ton freight service.

The outstanding advantages of wrought steel are well known. Let our wheel engineers bring you complete details of this further improvement. Carnegie Rim-Toughened Wrought Steel Wheels have created a new standard of service and value.

CARNEGIE STEEL COMPANY

PITTSBURGH, PENNA.

Subsidiary of United States Steel Corporation

154

CARNEGIE WROUGHT STEEL WHEELS

had risen from $11,469,274 in 1924-25 to $15,159,799 in 1929-30, while revenues during the same six-year period fluctuated from a low $16,252,612 in 1925-26 to a high of $18,788,708 in 1927-28.

Gross revenues, operating expenses and net revenues of the past seven fiscal years are tabulated below:

Fiscal year	Gross Revenues	Operating Expenses	Net Revenues
1924-25	$16,360,770	$11,469,274	$4,891,496
1925-26	16,252,612	12,219,069	4,033,543
1926-27	17,570,906	13,079,324	4,491,582
1927-28	18,788,708	14,175,650	4,613,058
1928-29	18,504,851	14,880,022	3,624,829
1929-30	17,820,319	15,159,799	2,660,520
1930-31	15,578,706	12,714,786	2,863,920

In all but three of the foregoing years —1924-25, 1926-27 and 1927-28—a deficit after interest charges was reported although up until 1929-30, i.e. taking the period from 1924-25 to 1928-29 as a whole, the alternating surpluses and deficits virtually offset each other. In 1929-30, however, the peak deficit of $1,969,861 was reported; this was reduced by only $119,300 during 1930-31 because the effect of the $203,400 rise in net revenues was mitigated somewhat by an increase during the year of $84,100 in interest charges.

Interest charges are increasing regularly from year to year—they amounted to $3,963,445 in 1924-25 and reached a total of $4,714,481 in 1930-31. The 1930-31 statement shows a total of $117,288,837 debited to capital as compared with $98,949,244 in 1924-25; the average capital cost per mile has increased during the same period from $26,507 to $28,501 and the mileage from 3,669 to 4,123.

The 1930-31 report is, however, most remarkable in its figures of operating expense reductions. As stated above the average number of employees was reduced by 16.23 per cent. In addition to this the train-miles run were reduced by 349,192 in the face of an increase in revenue ton-miles of 11,470,133, indicating a heavier train load. The increase in ton-mile production with the lighter traffic is accounted for by a rise of 15.88 miles in the average haul per ton of freight, from 102.53 miles in 1929-30 to 118.41 miles during the past year.

Among the major 1930-31 declines in traffic was that of timber; local timber traffic dropped 47.84 per cent as compared with 1929-30 and imported timber fell off 91.48 per cent. This latter is not, however, an important source of traffic since it amounted to only approximately 6,000 tons in the previous year. In fact domestic timber appears also to be a declining source of revenue; it has dropped regularly each year from a 1927-28 total of 554,409 tons to 210,169 tons last year. Other declines were: Local coal, coke, shale and charcoal, 23.59 per cent; fertilizers, 31.7 per cent; miscellaneous, 58 per cent, and live stock, 12.46 per cent. Passengers carried during 1930-31 totaled 11,702,741 as compared with 14,175,175 in 1929-30, a decline of 2,472,434.

The only important increase in traffic during the past year was the rise of 56 per cent in the tonnage of wheat carried. The average haul on this wheat traffic also increased from 139.5 miles to 153.87 miles so that the revenue from it was 63.8 per cent above the 1929-30 wheat traffic revenue. Wheat traffic accounted for 37.25 per cent of the total freight revenues during 1930-31 whereas it was responsible for but 20.63 per cent of the 1929-30 gross.

Great Britain Regains World Train Speed Honors

With the introduction, on September 14, of winter schedules, the honor of operating the fastest start-to-stop train in the world, held for the past few months by the Canadian Pacific, was regained by the Great Western of Great Britain, through a reduction of three minutes in the running time of its "Cheltenham Flier", between Swindon and Paddington (London).

The new Great Western schedule reduces the time allowed for the 77¼-mile Swindon-Paddington run from 70 to 67 minutes, and increases the Cheltenham Flier's speed from 66.3 to 69.18 m.p.h., an average slightly higher than that of 68.9 m.p.h. maintained by the C. P. R.'s "Royal York" in covering the 124 miles between Smith's Falls, Ont., and Montreal West in 108 minutes, as required by Canadian Pacific 1931 summer schedules. Newspaper dispatches from London indicate, however, that on its initial trip under the accelerated schedule the Great Western flier bettered even the unprecedentedly fast time regularly required, making the distance in one hour flat, while thousands of people lined the right-of-way between Swindon and London, or waited at Paddington station to witness the end of the record-breaking run.

The new schedule marks the third time within recent years that the Cheltenham Flier has been speeded up. It was originally scheduled, before the war, to run non-stop from Kemble to Paddington, 91 miles, in 103 minutes. When normal services were resumed following the war, a stop at Swindon was added, with 85 minutes allowed for the 77¼ miles to Paddington. In 1923 this was reduced to 75 minutes, this schedule remaining unchanged until September 24, 1928, when the train was temporarily withdrawn from service. Upon its restoration, July 8, 1929, its time was further cut to 70 minutes, making it the fastest start-to-stop train in the world, which honor it has now regained.

In addition to the new timing of the Cheltenham Flier, Great Western winter schedules will give that road the fastest night train in Great Britain, the 1:40 a.m. "West of England Express" covering the 225¾ miles from Paddington to Plymouth in 265 minutes, at an average speed of 51.1 m.p.h., while, altogether, 53 Great Western expresses will cover 4,359 miles, each week-day, at average start-to-stop speeds of from 55 to 69.18 m.p.h. Local accelerations, particularly in South Wales, will result in aggregate daily savings of 1,320 minutes, while train stops will be substituted for "slip-carriages" in eight instances, a change which will reduce the number of the latter still in operation from 35 to 27.

Although the Great Western schedules are the most outstanding from the speed viewpoint, winter timings on the other three major British railways have also been designed to produce improvements in passenger service. The London & North Eastern has paid particular attention to improvement of its London suburban services to and from King's Cross and Liverpool Street, while on the London, Midland & Scottish 418 semi-express and local trains have been accelerated by a daily total of 1,130 minutes. The Southern, although eliminating extra summer trains, will retain its principal main-line expresses and continue its intensive electrified suburban services in the London area.

Equipment and Supplies

FREIGHT CARS

E. I. du Pont de Nemours & Company has ordered one narrow gage tank car of 50,000 lb. capacity from the General American Tank Car Corporation.

PASSENGER CARS

The Atchison, Topeka & Santa Fe has ordered one combination baggage and mail gas-electric rail motor car from the J. G. Brill Company, to be equipped with a Brill 550 hp. Model 860 power plant. This is a duplicate of two cars recently furnished by the Brill Company to this road. Inquiry for this equipment was reported in the *Railway Age* of August 1.

IRON & STEEL

The Wabash has ordered 200 tons of structural steel for a bridge at Riverton, Ill., from the American Bridge Company.

The Delaware & Hudson has ordered 300 tons of steel for a bridge at Plattsburg, N. Y., from the McClintic-Marshall Corporation.

The New York, New Haven & Hartford has ordered 125 tons of steel for a bridge at Quincy, Mass., from the Boston Bridge Works.

The Pennsylvania has ordered 2,600 tons of steel for a station platform at Philadelphia, Pa., from the McClintic-Marshall Corporation.

The Delaware, Lackawanna & Western has ordered 3,000 tons of 130-lb. rail from the Bethlehem Steel Company. This is in addition to previous orders for 7,500 tons placed earlier this year.

SIGNALING

The Patapsco & Back Rivers has ordered from the General Railway Signal

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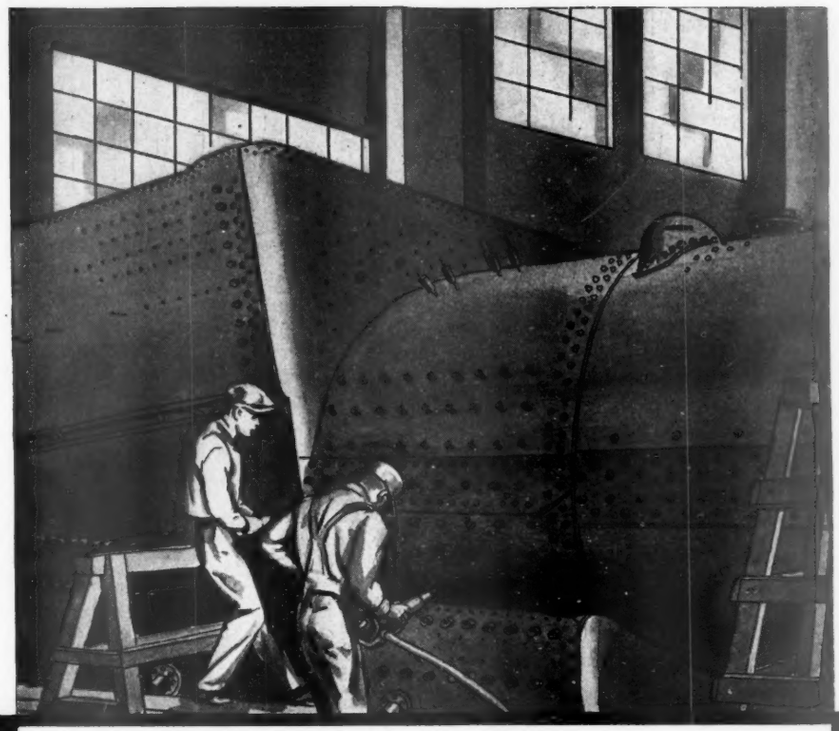

AGATHON NICKEL IRON

ALLOY STAYBOLTS
will cut down replacements

TONCAN COPPER Molybdenum IRON

LOCOMOTIVES have outgrown the old staybolt materials. Higher pressures and bigger boilers coupled with modern methods of operation have brought the modern staybolts of alloy steel or alloy iron.

Staybolt materials developed and proved by Republic Steel Corporation are in use by many of the leading railroads. Toncan Iron, Agathon Nickel Iron and Climax alloy staybolts have repeated records for reducing staybolt renewals.

With alloy staybolt material, corrosion resistance is greater and fatigue resistance is increased.

Whatever your staybolt requirements, Republic has a material to meet them.

CENTRAL ALLOY DIVISION
REPUBLIC STEEL
CORPORATION
Massillon, Ohio

Company a Saxby & Farmer interlocking, 12 levers, for Sparrows Point, Md.

THE CHESAPEAKE & OHIO has ordered from the General Railway Signal Company apparatus for an addition to the 36-lever interlocking at JN Tower, Richmond, Va.

THE BOSTON & ALBANY has ordered from the General Railway Signal Company a centralized traffic control machine to cover the territory between Pittsfield, Mass., and West Pittsfield, four miles. Two switches and eight signals will be operated.

THE CANADIAN NATIONAL has contracted with the General Railway Signal Company for centralized traffic control apparatus to be installed at Regina, Sask. The machine has 20 levers, only four of which are working levers. The other 16 are for contemplated additions governing wyes adjacent to the Canadian Pacific crossings.

THE ILLINOIS CENTRAL has ordered from the General Railway Signal Company an electric interlocking for the new suburban station at Randolph street, Chicago. This will be an important station in connection with the World's Fair in 1933, and the plan provides for subsequent additions to the tracks and enlargement of the machine.

THE CITY OF PHILADELPHIA, through the department of city transit, has contracted with the Union Switch & Signal Company for the complete installation of automatic block signals, electro-pneumatic train stops and interlockings, with centralized traffic control of all switches and signals, on the Ridge Avenue extension of the Broad street subway; and for the consolidation of the Spring Garden and Girard Avenue electro-pneumatic interlockings. The work involves a 67-lever electro-pneumatic interlocking to be installed at Fairmount Avenue Junction on the Broad street line, with a centralized traffic control machine at Fairmount tower for controlling the functions of an electro-pneumatic interlocking at Market street, which is the future junction point at which the Camden branch will connect with the Ridge Avenue line.

ZMA FOR WOOD PRESERVATION.—An eight-page folder with the foregoing title has been issued by the Curtin-Howe Corporation, New York City, describing and illustrating a large number of the uses being made of timber and lumber treated by the zinc-meta-arsenite pressure process.

THE LARK, Southern Pacific night express train between San Francisco and Los Angeles, now has an Oakland section. The Oakland train leaves Oakland Pier at 7:35 p.m. and is incorporated with the Lark from San Francisco at San Jose at 9:10 p.m., the train arriving in Los Angeles at 9.30 a.m. Returning, the Oakland section arrives at Oakland Pier at 9:25 a.m. The new Lark supplants the Padre, which has been operated out of Oakland on a slower schedule.

Supply Trade

Charles H. Gayetty has been appointed sales representative for the **Louisville Frog, Switch & Signal Co.**, Louisville, Ky., with headquarters at Philadelphia, Pa.

The United Engineers & Constructors have moved their general offices from 125 East Forty-sixth street to 2 Wall street, New York City.

C. B. Coldwell, formerly located in the Chicago office of the **International-Stacey Corporation,** Columbus, Ohio, has been transferred to the Ft. Worth, Tex., sales office.

The Railway Engineering Equipment Company, Chicago, has purchased the Direct Steaming System patents of the **Locomotive Terminal Improvement Company.** The rights to Canadian patents are vested in the **Direct Steaming Company of Canada, Ltd.**

Jonathan A. Noyes, manager of the **Sullivan Machinery Company,** with headquarters at Duluth, Minn., has been promoted to manager of the company's coal machinery sales division, with headquarters at Chicago, and has been succeeded by **Leon J. Cone,** representative, who has been appointed district manager.

The Stoughton Company, Stoughton, Wis., makers of wagons and commercial truck bodies, will now engage in trailer and truck equipment manufacture, and **Charles R. Jahn,** formerly sales manager of the Highway Trailer Company, has been appointed general manager of the newly formed division of the company.

William B. Ross, vice-president in charge of sales of **Edwin S. Woods & Co.,** has been elected president and a member of the board of directors. Mr. Ross began his railroad career with the Burlington, Cedar Rapids & Northern in August, 1889, as freight house clerk at Cedar Rapids, Iowa. In January, 1891, he was transferred to the auditor's office, where he served in various capacities until December, 1892. In January, 1893, he was appointed timekeeper and in July of that year, chief clerk to the superintendent. In July, 1898, he was appointed utility clerk to the vice-president and general manager. He was promoted to car accountant in July, 1901, and held that position until the B., C. R. & N. was absorbed by the Chicago, Rock Island & Pacific, in June, 1902, at which time he was made a car agent and later, in September, 1902, special representative of the general manager. A year later he was appointed transportation clerk to the third vice-president and in April, 1906, statistician to the president. In January, 1909, he was appointed a member of the standardization committee. In November, 1909, he organized a pension system and on January 1, 1910, was elected secretary of the Board of Pensions. He organized the personal record bureau in addition to his duties as secretary of the Board of Pensions in July, 1911, and later was appointed secretary of the Pension and Personal Record Bureaus. He resigned from railroad service on June, 30, 1916, to enter the railway supply business as secretary and assistant treasurer of Mudge & Co., Chicago. In April, 1917, he was elected secretary and treasurer and a year later, was appointed assistant to the president with headquarters at Washington, D. C. He was appointed district sales manager at New York in July, 1919, and resigned on April 30, 1920, to accept the position of manager of sales of Edwin S. Woods & Co. In April, 1928, he was elected vice-president in charge of sales, which position he has held until his election as president.

Roscoe Seybold, assistant to the president of the **Westinghouse Electric & Manufacturing Company,** has been appointed comptroller, with headquarters at East Pittsburgh, Pa. Mr. Seybold, who has been continuously in the service of the Westinghouse Company for 24 years, was born at Rockville, Ind., and graduated from Purdue University. He joined the Westinghouse organiza-

Roscoe Seybold

tion in 1907 as a graduate student. After completing this training course, he entered the price department, where he remained until 1926. During the period from 1909 until 1922 he was manager of the price section of the power and railway headquarters sales department and then until 1926 served in an executive capacity with the general sales manager. Since 1926 he was been assistant to the president.

OBITUARY

William H. Wattis, president of the Utah Construction Company and Six Companies Inc., contractors for Boulder Dam, died on September 13 after a long illness.

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BETTER FIRES

FIREBAR CORPORATION
CLEVELAND OHIO.

Construction

DELAWARE & HUDSON.—The Public Service Commission of New York has approved descriptions, maps and an estimate of cost in connection with the elimination of the Boardman, Main, Church and Bellamy street grade crossings of this company's tracks in Whitehall, N. Y. The commission has also ordered that crossings of the Delaware & Hudson with Fullerton street and Gansevoort-Butler road, Northumberland, N. Y., be closed and traffic from them diverted by construction of connecting highways to a nearby county highway crossing now protected by automatic signals.

DELAWARE, LACKAWANNA & WESTERN.—A contract for the construction of a highway bridge to carry Springfield avenue, New Providence, N. J., over this company's tracks has been awarded to the Roberts & Schaefer Company, Chicago. The work, which includes the construction of two concrete stairways, is to be started as soon as possible and completed by November 1, while the cost will be shared by the railroad and the state. In addition to 1,000 cu. yd. of foundation excavation and 6,000 sq. ft. of waterproofing, the project will require the placing of 1,800 cu. yd. of concrete and 31 tons of reinforcing steel, the latter to be furnished by the Harrison, N. J., plant of the Truscon Steel Company. In connection with the same grade separation project, a contract has also been let, jointly by the state and the railroad, to Osborne & Marsellis, Upper Montclair, N. J., for the construction of a new highway on Springfield avenue from Passaic avenue to a point 700 ft. west of its present crossing of the Lackawanna tracks. This part of the work, which is to be finished by December 1, includes 35,000 cu. yd. of excavation, 6,000 sq. yd. of reinforced concrete pavement, and necessary sidewalks, drains, etc.

DENVER & SALT LAKE.—The Interstate Commerce Commission has authorized this company to construct a connecting line from Dotsero, Colo., to Orestod, 41.3 miles, at a cost estimated at $2,555,000. The new line will connect the Denver & Rio Grande Western with the Denver & Salt Lake, control of which it has recently acquired, and will shorten the distance over the D. & R. G. W. between Dotsero and Denver by 173 miles.

ERIE.—Plans have been approved by the Indiana Highway Commission for the construction of a highway subway under six tracks of this road east of Huntington, Ind., at a total cost of about $140,000. It is expected that bids for the project will be received on October 15.

ERIE.—The New York Public Service Commission has approved as not excessive the low bid submitted by the Newhall Company, Cleveland, Ohio, for the elimination of the Main, Washington and Steuben street grade crossings of this company's tracks, Hornell, N. Y.

MISSOURI PACIFIC.—A contract has been awarded to the Winston Brothers Company, St. Louis, Mo., for the replacing of an existing 100-ft., three-track concrete arch bridge over the River des Peres at Carondelet, St. Louis, with a new three-track structure having a substructure designed to carry four tracks. The new bridge has an estimated cost of $100,000 and has been made necessary by improvements in the River des Peres, which have been undertaken by the City of St. Louis.

NEW YORK CENTRAL-BUFFALO, ROCHESTER & PITTSBURGH.—In order to remove the last dangerous grade crossings in the city of Rochester, N. Y., the Public Service Commission of New York has directed elimination of crossings of the tracks of these two railroads at York, Child, Colvin, Ames and Hague streets, in the west side industrial section of the city. The Ames and Child street crossings will be eliminated by lowering the streets, revising the grade of the railroad tracks, and carrying the streets under the tracks in underpasses 60 ft. wide, approximately 2,000 ft. long and costing about $664,300 and $492,000, respectively. Crossings at the other three streets will be closed and the streets discontinued across the tracks affected, which vary in number from seven to thirteen. Pedestrian subways will be constructed at each of these latter crossings, at estimated costs running from $49,000 to $88,600. The New York Central is to prepare plans and do most of the work, but the cost will be divided between the two railroads, the state and the city.

NEW YORK, CHICAGO & ST. LOUIS.—This road contemplates the construction of a new yard in the 103rd Street area at Chicago to replace its yard north of Ninety-fifth street near Stony Island avenue, which is to be abandoned to allow the opening of a number of city streets.

NEW YORK, NEW HAVEN & HARTFORD.—This company has awarded to the Tredennick-Billings Company, Boston, Mass., a contract for grade crossing elimination work costing about $55,000 at Quincy, Mass.

NEW YORK, NEW HAVEN & HARTFORD.—The New York Public Service Commission has ordered the reconstruction, at an estimated cost of about $205,100, of the bridge carrying this company's tracks over Main street, Port Chester, N. Y.

PENNSYLVANIA.—As part of its general improvement program at Baltimore, Md., this company has awarded to the Arundel Corporation, of Baltimore, contracts for the construction of bridges to carry the railroad tracks over Gay, Preston, Wolfe, Washington and Biddle streets, all in Baltimore. The contract also covers relocation of Ellsworth street in connection with the construction of a new Union railroad tunnel to provide additional trackage through the city. The total cost of this work is approximately $150,000.

PORT OF NEW YORK AUTHORITY.—The general contract for building the superstructure of the union inland freight terminal, between Eighth and Ninth avenues and West Fifteenth and Sixteenth streets, New York City has been given to the Turner Construction Company, New York, the low bidder, at $7,591,000. The contractor is to furnish all materials required for the building above the foundation. Details of this work were summarized in the *Railway Age* of September 19, page 459.

ULSTER & DELAWARE.—A bid of $72,758 submitted by Robert E. Tompkins, Rochester, N. Y., for the elimination of an Ulster & Delaware grade crossing just west of Davenport Center station, Davenport, N. Y., has been approved by the Public Service Commission of New York.

Financial

CENTRAL OF ARKANSAS.—*Abandonment.*—The Interstate Commerce Commission has authorized this company to abandon, as to interstate and foreign commerce, its entire line extending 6.2 miles southward from Ola, Ark., to Plainview.

CHESAPEAKE & OHIO.—*Kanawha Central Notes.*—The Interstate Commerce Commission has authorized the Kanawha Central to issue a promissory note for $16,202, payable to the Chesapeake & Ohio in payment of indebtedness, and secured promissory notes totaling $16,000 to be pledged as collateral security for the former note.

CHICAGO & NORTH WESTERN.—*Bonds.*—The Interstate Commerce Commission has authorized this company to procure the authentication and delivery of $555,00 of 4½ per cent general mortgage bonds of 1987 in reimbursement for expenditures for additions and betterments for the retirement of underlying bonds.

DENVER & RIO GRANDE WESTERN.—*Control of Moffatt Line.*—The Interstate Commerce Commission has authorized this company to acquire control of the Denver & Salt Lake by the acquisition of a majority of its capital stock.

GARYVILLE & NORTHERN.—*Abandonment.*—This company has applied to the Interstate Commerce Commission for authority to abandon its line between Garyville, La., and Livingston, including 18.73 miles owned and 16.27 miles of line owned by the Lyon Lumber Company over which it operates under trackage rights.

LOUISVILLE & NASHVILLE.—Bonds.—This company has applied to the Interstate Commerce Commission for authority to issue and sell $10,000,000 of 5 per cent ten-year secured bonds to be secured by pledge of $13,900,000 of other bonds. The proceeds are to be used to provide funds for the construction of a bridge across the Ohio river at Henderson, Ky., and

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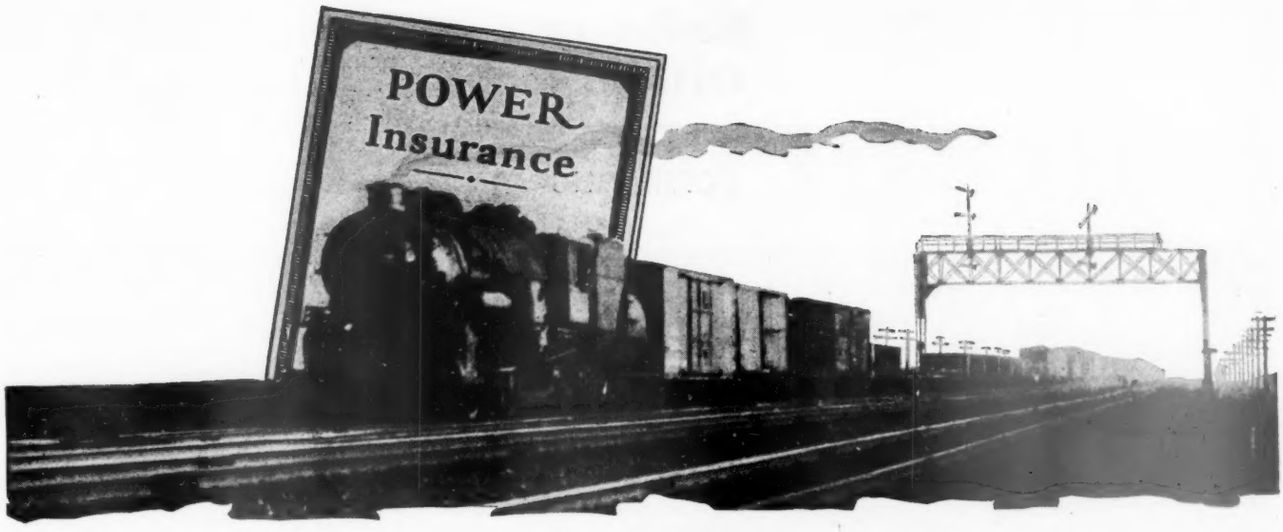

A Vital Factor
in Economical Operation

WHY is it that the big percentage of American locomotives are equipped with valve and cylinder wearing parts of HUNT-SPILLER *Air Furnace* GUN IRON? ..... Because their ability to stand up in the face of constantly increasing frictional wear and mounting superheat temperatures prevents those leaks which waste fuel and reduce efficiency.

This is one of the major reasons why railroad men consider HUNT-SPILLER *Air Furnace* GUN IRON to be one of the greatest factors contributing to the economy of locomotive operation.

Your road should carry this insurance against such losses.

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Cylinder Bushings
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Parts Finished for Application

Dunbar Sectional Type Packing
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(Duplex Springs for Above Sectional Packing)
Cylinder Snap Rings
Valve Rings All Shapes

HUNT-SPILLER GUN IRON
Air Furnace

to pay $7,963,000 of indebtedness maturing on November 1. It is proposed to sell the bonds at 95¾ to J. P. Morgan & Co.

NORFOLK & WESTERN.—*Recapture Case.*—The Interstate Commerce Commission has announced a further hearing at Washington on November 3 before Examiner Walton at which the company may present evidence in support of its protest against the tentative recapture report in which its excess net operating income was calculated at $30,000,000.

NORTHERN PACIFIC.—*Reduces Dividend.*—Directors of this company have declared a quarterly dividend of 75 cents payable November 2 to stockholders of record October 5. Previously the rate was $1.25 quarterly.

PENNSYLVANIA.—*Cleveland & Pittsburgh Bonds.*—The Interstate Commerce Commission has authorized the Cleveland & Pittsburgh to issue $3,126,000 of general and refunding mortgage 4½ per cent bonds, series B, the bonds to be delivered at par to the Pennsylvania in partial reimbursement for capital expenditures. The Pennsylvania is to assume obligation for the bonds as lessee.

SOUTHERN PACIFIC.—*Stock.*—This company has applied to the Interstate Commerce Commission for authority to issue 66,268 shares of additional stock, to be exchanged for common and preferred stock of the St. Louis Southwestern in accordance with an offer recently made to a stockholders' committee. The Southern Pacific has pending with the commission an application for authority to acquire control of the Cotton Belt.

Dividends Declared

Cleveland, Cincinnati, Chicago & St. Louis.—Preferred, 1¼ per cent, quarterly, payable October 31 to holders of record October 7.

Joliet & Chicago.—1¼ per cent, quarterly, payable October 5 to holders of record September 25.

Kansas City Southern.—Common Dividend Omitted; Preferred, 1 per cent, quarterly, payable October 15 to holders of record September 30.

Minneapolis, St. Paul & Sault Ste. Marie, Leased Lines, 2 per cent, payable October 1 to holders of record September 19.

Norfolk & Western.—Adjustment Preferred, $1.00, quarterly, payable November 19 to holders of record October 31.

Average Prices of Stocks and of Bonds

	Sept. 22	Last week	Last year
Average price of 20 representative railway stocks.	47.41	49.77	111.72
Average price of 20 representative railway bonds..	81.29	84.07	95.78

THE FALL TIME TABLE OF THE PENNSYLVANIA features of which were noticed in the *Railway Age* last week, page 457, provides for fast trains from New York to Philadelphia every 30 minutes during the business day; and there will be substantially equal frequency in the opposite direction. The regular Philadelphia expresses will start on the hour, as at present, and the alternate schedules will be filled with trains for Baltimore and Washington, slightly rearranged and augmented.

Railway Officers

OPERATING

Effective October 1, the positions of general superintendent of the Central district and of the Lake and Eastern districts of the Great Northern will be abolished. **R. A. McCandless,** general superintendent of the Central district, with headquarters at Great Falls, Mont., has been appointed superintendent of the Dakota division, with headquarters at Grand Forks, N. D., succeeding **J. L. Close,** who has been transferred to the Willmar division, with headquarters at Willmar, Minn. **C. McDonough,** general superintendent of the Lake and Eastern districts, with headquarters at St. Paul, Minn., has been appointed superintendent of the Spokane division, with headquarters at Spokane, Wash.

Various changes in the personnel of the Illinois Central have taken place coincident with the consolidation of several divisions on September 21. The Wisconsin division has been abolished and the Freeport district, except Freeport yards, has been added to the Chicago Terminal, while the Amboy, Madison and Dodgeville districts have been added to the Springfield division. The Mattoon, New Harmony and McClains districts of the Springfield division have been added to the Illinois division. The Tennessee division has been abolished and the Bluford district has been added to the St. Louis division, the Fulton, Hickman and Troy districts have been added to the Kentucky division, and the Cairo district has been added to the Mississippi division. The office of superintendent of the New Orleans Terminal has been abolished, and the jurisdiction of the superintendent of the Louisiana division at McComb, Miss., has been extended to include the New Orleans terminal.

J. W. Cousins, superintendent of the New Orleans terminal, with headquarters at New Orleans, La., has been appointed superintendent of the Louisiana division and the Gulf & Ship Island, with headquarters at McComb, to succeed **E. L. McLaurine,** who has been appointed trainmaster of the McComb district and the Canton district to Jackson on the Louisiana division, with headquarters at McComb, to succeed **T. K. Williams,** who has been appointed trainmaster of the Canton district from Jackson to Canton and the Yazoo district of the Louisiana division, with headquarters at Jackson, to succeed **J. E. Schneider,** who has been assigned to other duties. **G. F. Dickson,** assistant superintendent at Hattiesburg, Miss., has been appointed trainmaster of the Gulf & Ship Island, with the same headquarters. **J. B. Hamilton,** superintendent of freight service, with headquarters at Chicago, has been appointed assistant superintendent of the Chicago Terminal with headquarters at Chicago, a newly created position. **A. Bernard,** superintendent of passenger service, with headquarters at Chicago, has been appointed superintendent of suburban service, with the same headquarters. **R. W. Watts,** trainmaster at Twelfth street, Chicago, has been appointed trainmaster at Congress street, including the coach yard, succeeding **G. H. Bateman,** assigned to other duties. The office of night trainmaster at Markham has been abolished. The jurisdiction of **F. R. Campbell,** trainmaster at Hawthorne, has been extended to include the Freeport district of the Chicago Terminal. **H. W. Williams,** superintendent of the Tennessee division, with headquarters at Fulton, Ky., has been appointed trainmaster of the Fulton, Hickman and Troy districts of the Kentucky division, with the same headquarters, to succeed **O. H. McFarlin,** who has been assigned to other duties. **H. J. Roth,** superintendent of the Wisconsin division, with headquarters at Freeport, Ill., has been appointed trainmaster of the Amboy, Madison and Dodgeville districts and the Freeport yards of the Springfield division, with the same headquarters. The jurisdiction of **C. F. Duggan,** trainmaster of the Springfield district of the Springfield division, has been extended to include the Peoria district. **C. A. Keene,** trainmaster at Mattoon, Ill., has been appointed trainmaster of the Indianapolis, Bloomington Southern, Effingham, Mattoon, New Harmony and McClain's districts of the Illinois division with headquarters at Palestine, Ill., to succeed **C. W. Lentz,** who has been assigned to other duties. The position of trainmaster at Mattoon has been abolished. **W. W. Cunningham,** trainmaster at Baton Rouge, La., has been appointed trainmaster of the New Orleans division, with the same headquarters, to succeed **W. K. McKay,** who has been appointed assistant trainmaster of the New Orleans division, with the same headquarters, to succeed **B. F. Galvani,** who has been assigned to other duties.

TRAFFIC

J. F. Harris, assistant to the vice-president, traffic, of the Missouri Pacific, with headquarters at St. Louis, Mo., has been appointed assistant traffic manager, with headquarters at Denver, Colo., where he will have jurisdiction over freight and passenger traffic in Colorado and Utah.

Sidney D. Sparkes, who has been promoted to general freight agent on the Missouri-Kansas-Texas of Texas, as noted in the *Railway Age* for September 19, has served a total of 22 years in the traffic department of a number of southwestern roads. He was born on July 7, 1893, at Jacksonville, Ill., and received a high school and busi-

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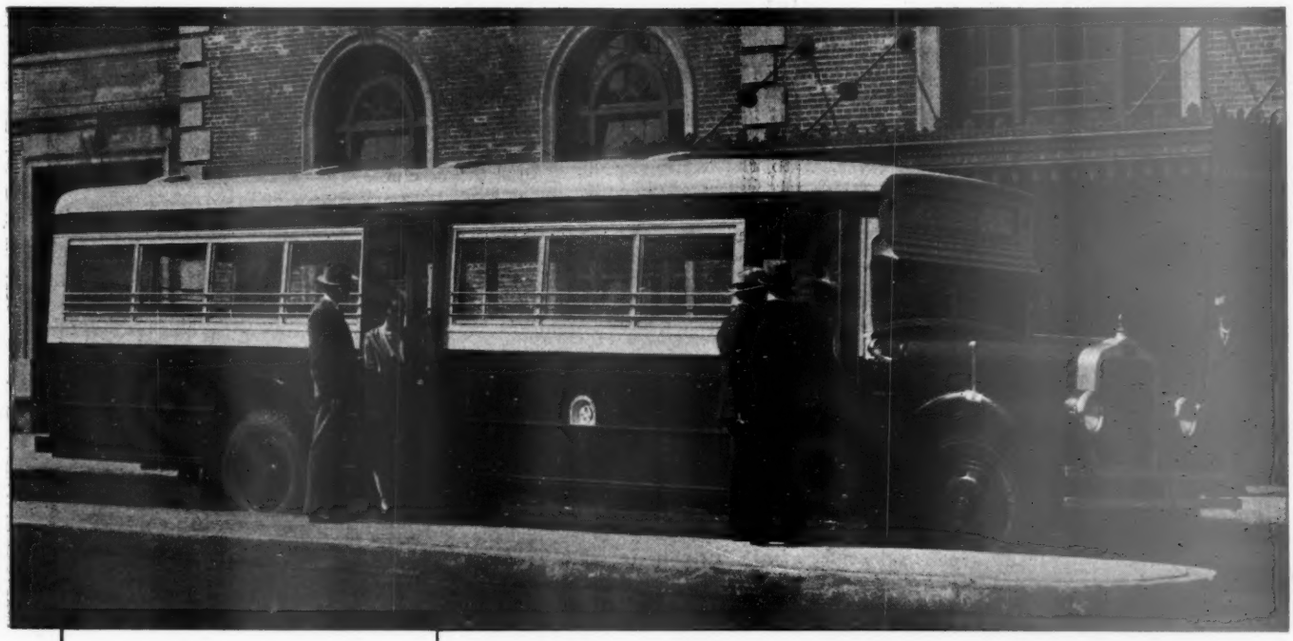
More Performance



Features of New 5-A ENGINE

Overhead Valves

4⅝" bore, 5¾" stroke. Piston displacement 580 cubic inches.

18% increase in torque.

Counterweighted 7 bearing crankshaft, alloy steel heat treated with cast iron crankcase of exceptional rigidity.

100% oil filtering system.

Dual ignition, electrically synchronized with all ignition wires running from a single distributor head.

Special designed cylinder head with inserted exhaust valve seats.

Provision is made for tachometer drive.

Quick accessibility to all major parts.

WHITE Coaches have become the first choice of the country's leading operators because they unfailingly deliver more performance with greater economy.

More performance in the form of higher operating efficiency, faster schedules and increased flexibility for city traffic or higher average speeds for inter-city service.

Greater economy in the form of lowest cost per coach mile.

For special types of service requiring increased power for higher average speeds and greater acceleration, White has developed the new 5-A Engine for Models 54 and 54-A.

Following the highly successful series of White engines the new 5-A Engine is a big step forward — an important contribution to increased operating performance.

The complete line of six cylinder White Coaches ranges from 16 to 41 passengers, offering a proper unit for every type of operation. The ability to maintain on-time schedules plus greater riding comfort assures greater passenger revenue and more profits for the operator. The White Company, Cleveland.

WHITE COACHES

ness college education. He entered railway service in the fall of 1909, as an office boy in the traffic department of the Atchison, Topeka & Santa Fe at Amarillo, Tex., and in July, 1913, he went with the Kansas City, Mexico & Orient of Texas (now part of the Santa Fe), as a stenographer at San Angelo, Tex. He was promoted to chief clerk in the passenger department at that point three years later and in August, 1917, he went with the United States Department of Agriculture at Ft. Worth, Tex. In December of the same year Mr. Sparkes entered the service of the Katy as soliciting freight agent at Galveston, Tex., but left this road five months later to become a clerk on the Galveston, Houston & Henderson at the same point, returning to the Katy on August 16, 1918, as rate and division clerk at Dallas, Tex. In October, 1919, Mr. Sparkes became chief clerk to the general freight and passenger agent and auditor of the Christie & Eastern, with headquarters at Shreveport, La., returning to the Katy in May, 1920, as tariff inspector, compiler and rate clerk at Dallas. Two years later he was promoted to chief rate clerk and chief clerk to the general freight agent at the same point, being further advanced to assistant general freight agent at St. Louis on November 1, 1926. A few months later Mr. Sparkes was transferred to Dallas as assistant general freight agent, which position he held until his recent promotion to general freight agent, at that point, effective September 1.

ENGINEERING AND SIGNALING

A. Hall Yocum, signal engineer of the Reading, with headquarters at Philadelphia, Pa., has retired effective September 1. Mr. Yocum was born in Chester County, Pennsylvania, on October 30, 1864, and was graduated from Dickinson College in 1888. He entered railway service as signal foreman with the Philadelphia & Reading (now the Reading Company), in February, 1895, since when he was promoted through various positions, becoming signal engineer in July, 1900, and holding this position until his recent retirement.

G. M. O'Rourke, district engineer of the Western lines of the Illinois Central, with headquarters at Waterloo, Iowa, has had his jurisdiction extended to include the Northern lines, with headquarters at Chicago. **W. R. Gillam,** district engineer of the Northern lines, with headquarters at Chicago, has been appointed division engineer of the Iowa division, with headquarters at F. Dodge, Iowa, succeeding **N. R. Hill,** who has been assigned to other duties. **M. B. Morgan,** district engineer of the Yazoo & Mississippi Valley, has had his jurisdiction extended to include the Southern lines and the Gulf & Ship Island, with headquarters as before at Memphis, Tenn. The position of district engineer of the Southern lines and of the Gulf & Ship Island, which has been held by **J. E. Fanning,** with headquarters at New Orleans, La., has been abolished and Mr. Fanning has been assigned to other duties. **J. E. Rogan,** division engineer of the New Orleans terminal, with headquarters at New Orleans, has been transferred to McComb, Miss., where his jurisdiction will include the Louisiana division and the Gulf & Ship Island, the New Orleans terminal having been absorbed by the Louisiana division. Mr. Rogan succeeds **C. M. Chumley,** who has been transferred to the Kentucky division, with headquarters at Louisville, Ky., succeeding **P. Glynn,** retired. Following the abolition of the Wisconsin division and its absorption by the Chicago terminal and the Springfield divisions, **S. C. Jump,** division engineer of the Wisconsin division with headquarters at Freeport, Ill., has been assigned to other duties. The Tennessee division has been absorbed by the St. Louis, Kentucky and Mississippi divisions, and **S. J. Holt,** division engineer of the Tennessee division with headquarters at Fulton, Ky., has been transferred to the Mississippi division, with headquarters at Water Valley, Miss., where he succeeds **T. M. Pittman, Jr.,** who has been assigned to other duties.

Lem Adams, general supervisor maintenance of way of the Union Pacific System, has been promoted to the newly created position of system engineer maintenance of way, with headquarters as before at Omaha, Neb. The position of general supervisor maintenance of way has been discontinued. Mr. Adams has been in the service of the Union Pacific continuously for more than 22 years. He was born on June

Lem Adams

6, 1886, at Buda, Tex., and graduated from the Texas A. & M. College with the degree of bachelor of science in civil engineering. He entered the service of the Union Pacific System in June, 1909, as a rodman on the Oregon Short Line, becoming a draftsman a year later. From June, 1911, to March, 1916, he served successively as an estimator and as chief draftsman. Mr. Adams was promoted to assistant division engineer on the latter date, being appointed engineering accountant in 1917 and contract engineer in 1918. A year later he was transferred to the Union Pacific unit of the system with the title of special field engineer in the maintenance of way department, then being advanced to roadway assistant of the system with headquarters at Omaha, in April, 1920. On May 15, 1929, Mr. Adams was made general supervisor maintenance of way at Omaha, which position he held until his recent promotion, effective September 16.

MECHANICAL

W. H. Flynn, general superintendent of motive power and rolling stock of the New York Central, has been appointed also to the same position on the Michigan Central, with headquarters as before at New York.

J. S. Wilson, superintendent of shops for the Michigan Central, has been appointed general foreman in charge of the West Detroit (Mich.) car shops, with headquarters as before at West Detroit, following the abolition of the position of superintendent of shops.

MOTOR TRANSPORT

B. W. Coldewey, district agent of the Pacific Greyhound Lines, Inc., has been appointed district traffic manager, with headquarters at Portland, Ore., succeeding **F. J. Burns,** transferred. **George H. Pierce,** district agent at San Jose, Cal., has been appointed district traffic manager, with headquarters at Los Angeles, Cal., succeeding **E. S. Sullivan,** transferred.

OBITUARY

George N. Orcutt, formerly vice-president of the Erie, died at his home in Hornell, N. Y., on September 20, after a long illness. He was born on July 13, 1856, at North Troy, Vt., and received his education at the University of Michigan and at Columbia College Law School. He entered railway service in 1900, as local attorney of the Erie at Hornell, N. Y., and continued with that road until his retirement. From December, 1915 to period of Federal control he was vice-president in charge of purchasing, land, tax and federal valuation departments. During Federal control, he served as corporate vice-president and from March 1, 1920, until his retirement early in 1924, as vice-president in charge of federal valuation, contracts for materials and supplies and freight claims.

SEPTEMBER 26, 1931

Railway Age

TRANSPORTATION LIBRARY

FOUNDED IN 1856

SELECTIVE TRAVEL ATTACHMENTS

ILLUSTRATION SHOWN WITH NEAR SILL REMOVED

PERMIT USE OF

DRAFT GEARS WITH

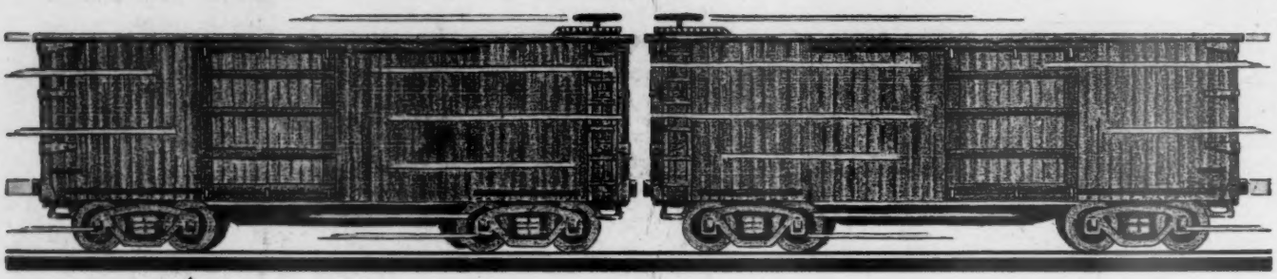
CAPACITY UNDER BUFF

INCREASED 100%

WITHOUT CHANGE IN CAR CONSTRUCTION

THE SYMINGTON COMPANY

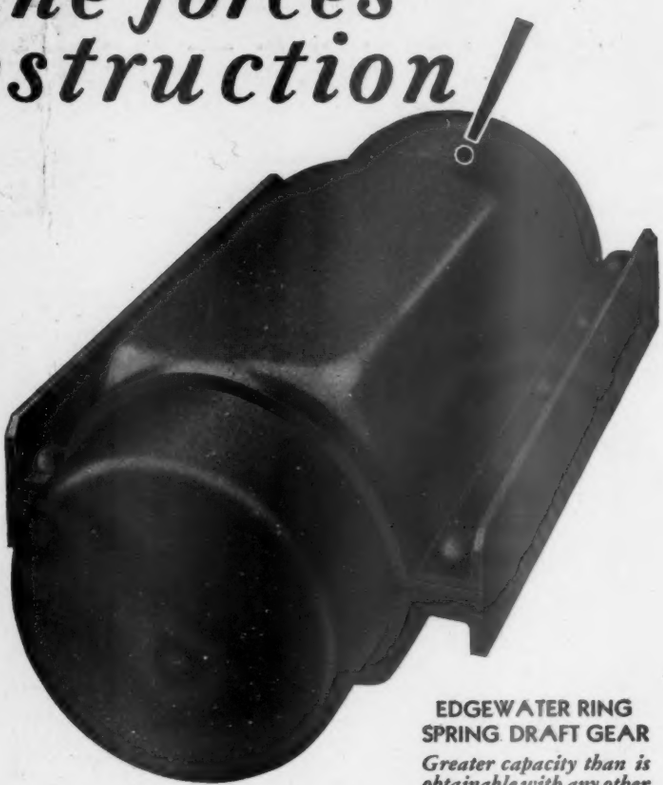
CAPACITY



Arresting the forces of destruction!

THE destructive forces of impact must be arrested by gears of high capacity. Low draft gear capacity means high upkeep costs for cars and undue claims for injury to lading.

The Edgewater Ring Spring Draft Gear arrests the forces of destruction by providing greater capacity than is obtainable with any other gear which fits the standard A. R. A. pocket.



EDGEWATER RING SPRING DRAFT GEAR

Greater capacity than is obtainable with any other gear which fits the standard A. R. A. pocket.

EDGEWATER STEEL COMPANY
PITTSBURGH, PA.

NEW YORK	CHICAGO	BOSTON
WASHINGTON	SEATTLE	ST. LOUIS
PHILADELPHIA	LOUISVILLE	ST. PAUL
BALTIMORE	KANSAS CITY	ATLANTA
	SAN FRANCISCO	

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Address communications to 30 Church St., New York City.

TORONTO UNION TERMINAL

SELECTED

G-R-S ALL-ELECTRIC INTERLOCKING

THE Toronto Union Terminal, representing Canada's two great railway systems, the Canadian National and Canadian Pacific, after considering every type and form of power interlocking, selected this system as the best suited to control the extensive traffic into and out of the terminal with speed, safety and economy. G.R.S. All-Electric Interlocking was selected only after years of consideration as the construction of the terminal proper was started prior to the world war.

Three large interlocking plants have been installed having a combined total of 409 working levers controlling 545 interlocking units on an unusually complicated track layout extending over a terminal area 4½ miles long.

G.R.S. All-Electric Interlocking has been the solution for many installations both large and small. The adaptability and flexibility of this system will serve your requirements to the best advantage in the solution of your next interlocking problems.

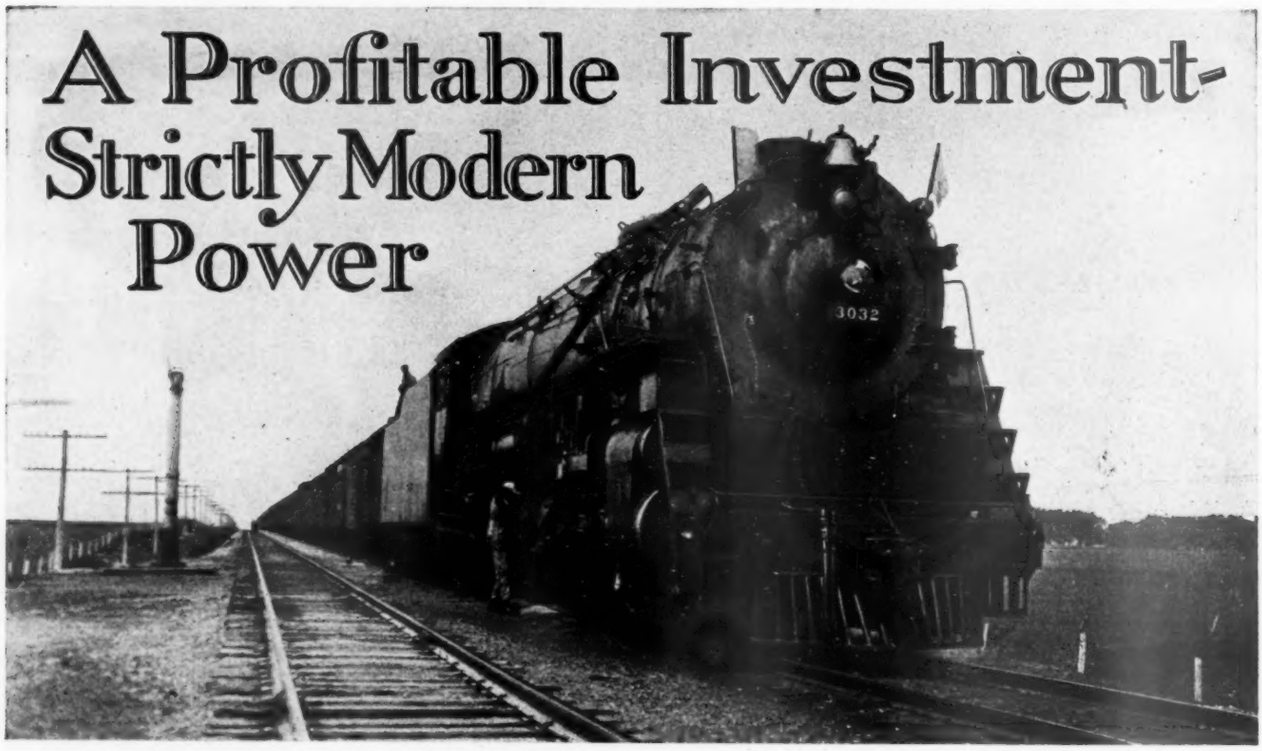
GENERAL RAILWAY SIGNAL COMPANY

ROCHESTER, N. Y.

New York Chicago St. Louis A-856

Affiliated Companies' Offices: Montreal London Paris Tokyo Barcelona Melbourne Calcutta Buenos Aires

A Profitable Investment- Strictly Modern Power



"YES, when traffic comes back we may want some new power, but just now I wouldn't buy an extra pin"—so runs the tale.

Traffic will come back. All this surplus wheat and cotton, for instance, will be used some day.

But where money can be saved now, why wait? Increased traffic in the future will simply make any well-advised purchase still more productive.

It takes Modern Locomotives to make money these days!

THE BALDWIN LOCOMOTIVE WORKS 1831 1931

THE BALDWIN LOCOMOTIVE WORKS

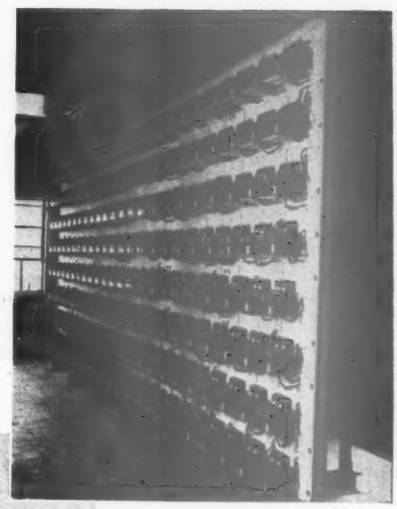
PHILADELPHIA

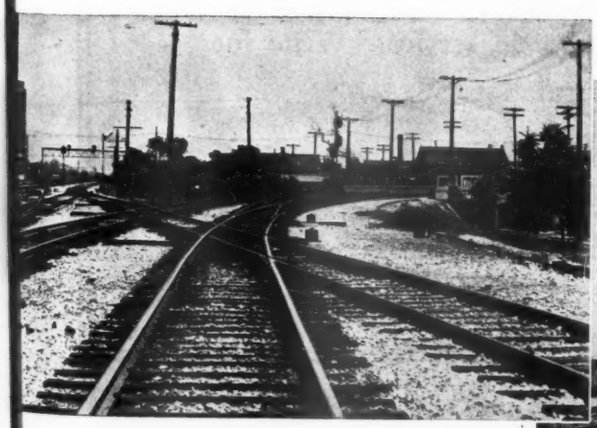
Substantial Saving"

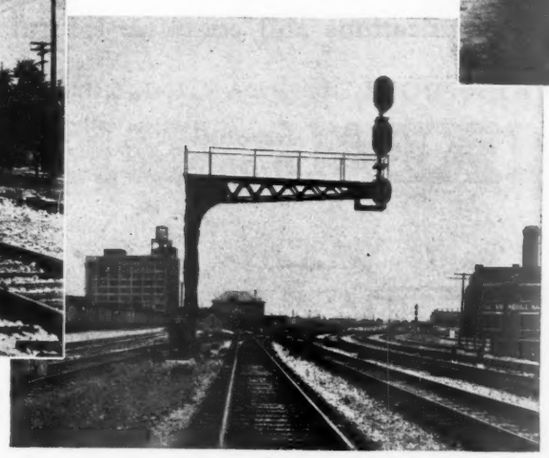
"THE total cost of this installation was approximately $360,000.00, and a saving over and above the interest, depreciation and operating charges will result from this investment. The greatest tangible savings effected was caused by the elimination of the large number of switch tenders formerly required. Other appreciable savings, however, are evident by the elimination of the many heretofore necessary train stops, and the resulting increase in the speed and ease of train operation and movements. With all traffic under the direction of one man, safety has been raised to a high degree of satisfaction and is being so recognized by the traveling public."

Thus, in the August, 1931, issue of *Railway Signaling*, are summarized the economies resulting from an installation of the "Union" Electro-Pneumatic Interlocking System at the new Indianapolis Terminal. In addition, the installation has provided "perfect safety and adequate flexibility for an average of 200 train movements per day" by the six railways serving the city and using the new terminal.

And a similar summary has resulted from all "Union" Electro-Pneumatic Interlocking installations. Consult our nearest district office for detailed information as to how such economies are effected.

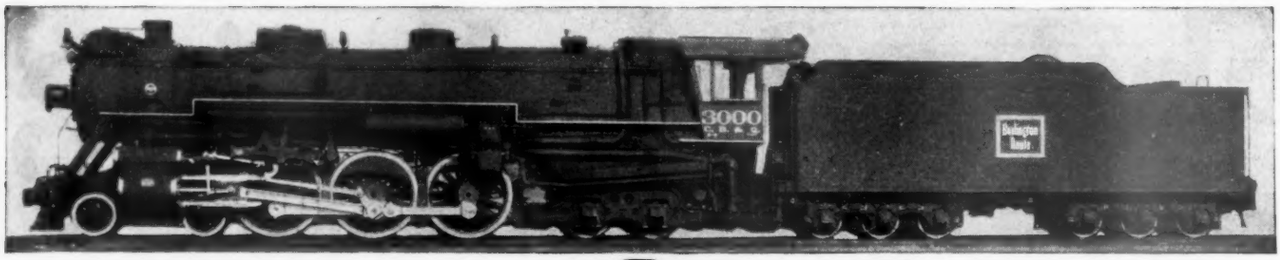






1881 Union Switch & Signal Co. 1931

SWISSVALE, PA.



Tapered Roller TIMKEN BEARING EQUIPPED

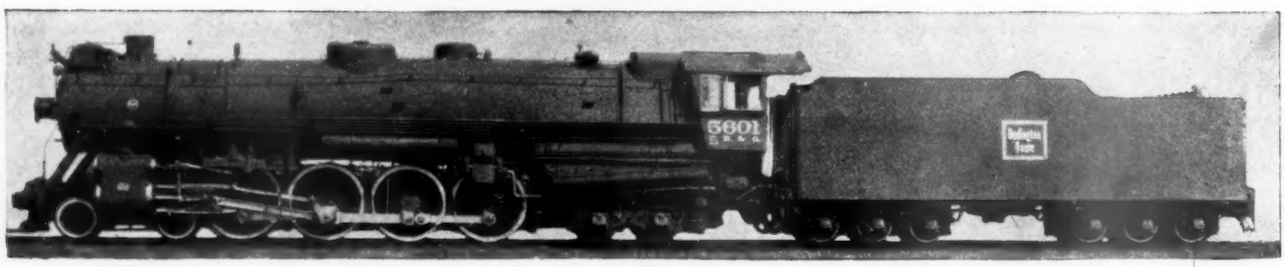
Timken Roller Bearing Engine Trucks on the C. B. & Q.

The Chicago, Burlington and Quincy Railroad, (Burlington Route) has 24 locomotives equipped with Timken engine trucks in service. Both passenger and freight types, as illustrated, are included in this number. Like many other prominent roads, the C. B. & Q. has found that locomotives equipped with Timken engine trucks can be relied upon for continuous uninterrupted service over longer periods of time, (no hot boxes) and cost less for operation and maintenance . . . It will pay you to specify Timken engine trucks for your new locomotives. They can also be applied to practically any type of locomotive now in service. Write for blue prints, specifications and complete information.

THE TIMKEN ROLLER BEARING COMPANY, CANTON, OHIO

TIMKEN *Tapered Roller* BEARINGS

Tapered Roller TIMKEN BEARING EQUIPPED



The CAST STEEL AGE IN RAILWAY EQUIPMENT

LOCOMOTIVE BED WITH INTEGRAL AIR RESERVOIR

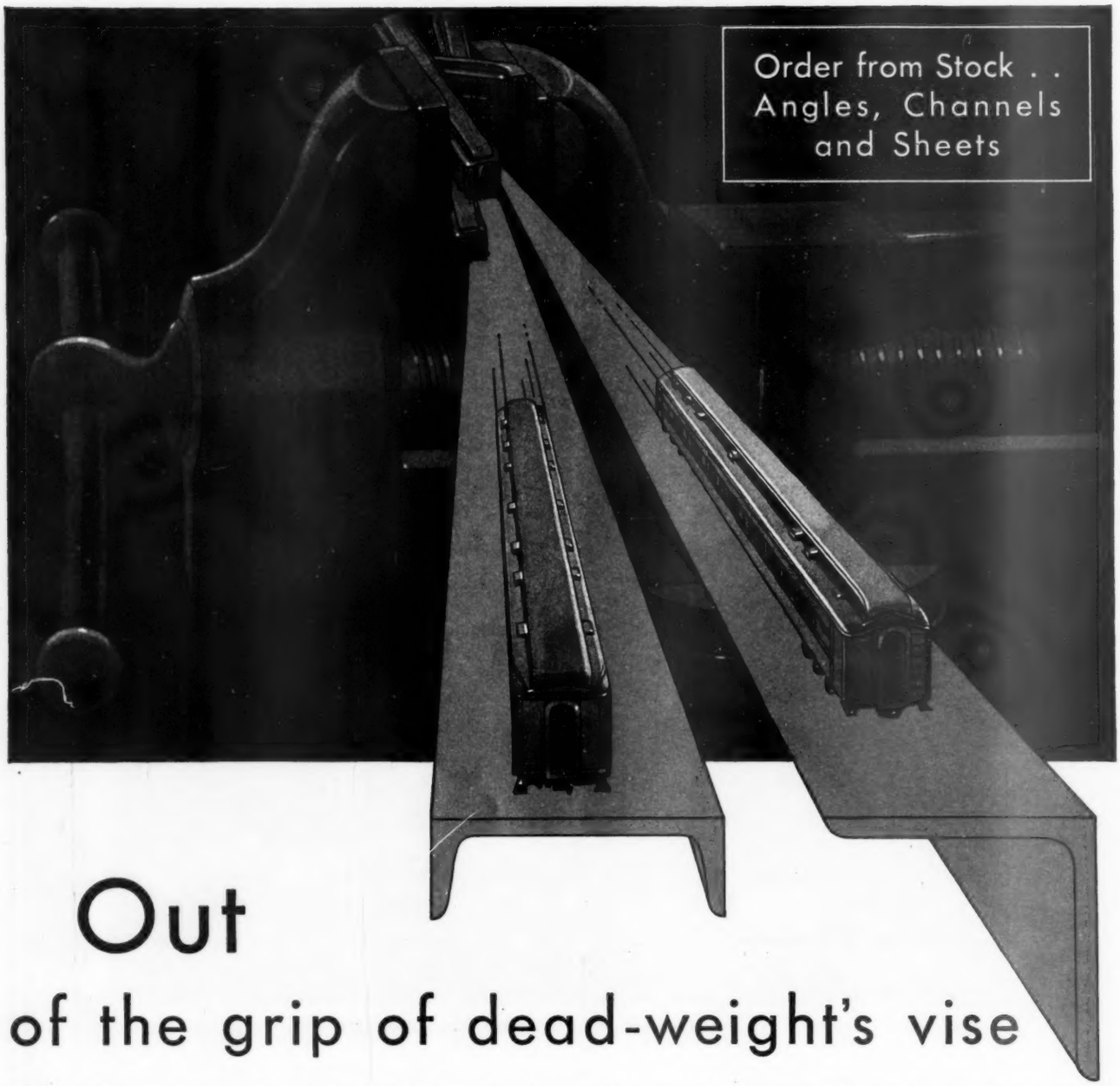
COMMONWEALTH ONE-PIECE LOCOMOTIVE BED

Forms a Strong Foundation for Efficient Modern Locomotives
and Greatly Simplifies Locomotive Design and Construction

INSURES LONG-TERM SATISFACTION AND ECONOMY

COMMONWEALTH CAST STEEL BEDS IN USE ON 36 RAILROADS

GENERAL STEEL CASTINGS CORP.
GRANITE CITY, ILL. EDDYSTONE, PENN.



Out
of the grip of dead-weight's vise

Today the accent is on pay-load. Useless dead-weight can't compete in the new system of things. "ALUMINIZE"—and you both shake off dead-weight and make the improvement pay for itself.

Tons of excess dead-weight are lifted from frames, roofs, doors, floor members, panels, seats, conduit and fittings when Alcoa Aluminum replaces dead-heavy metals. The strong alloys of Alcoa Aluminum weigh only 1/3 as much as these old-fashioned metals. Structural safety is assured by a tensile strength of 55,000 pounds per square inch.

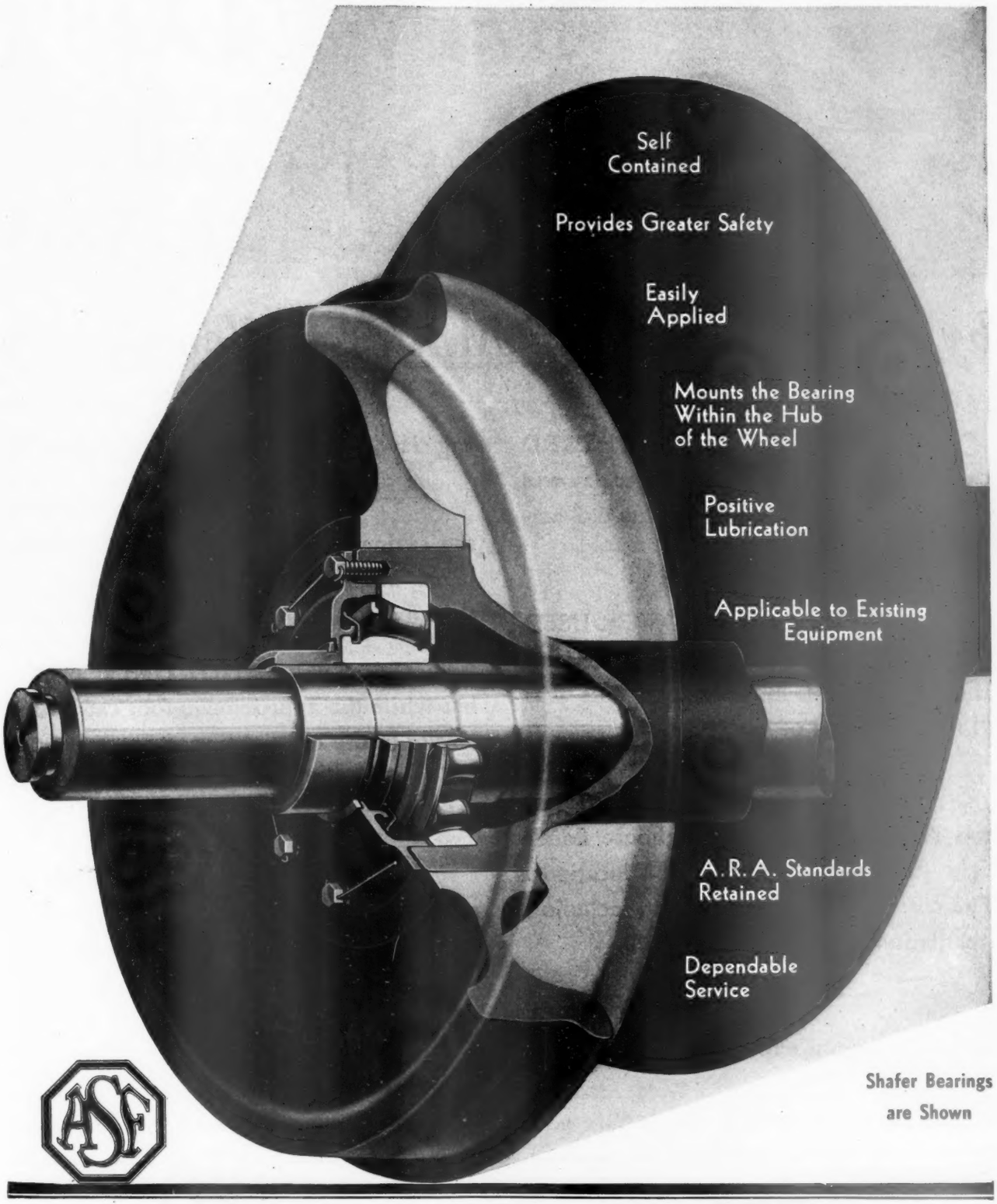
Relieved of excess dead-weight schedules speed up and power is saved, while tracks and brakes wear longer. Even paint costs, which represent quite an item, are reduced, because paint lasts longer when applied over non-rusting Alcoa Aluminum.

Standard structural shapes of the strong alloys of Alcoa Aluminum, in sizes up to 10 inches in depth and 90 feet in length, are carried in stock. Plates, sheet, rivets, bolts and screws are also available.

The engineering handbook, "Structural Aluminum," is available at $1.00 a copy. Please address ALUMINUM COMPANY *of* AMERICA; 2478 Oliver Building, PITTSBURGH, PENNSYLVANIA.

ALCOA ALUMINUM

American Steel Foundries Roller Bearing Unit



AMERICAN STEEL FOUNDRIES

NEW YORK CHICAGO ST. LOUIS

Almost

2/3 SAVED on power and maintenance costs

by installation of Modern Floodlights

A CLASSIFICATION YARD capable of handling 8,000 cars per day was lighted by 300 street series lights 6.6 amperes, 2500 lumens.

THE POWER USED for this lighting cost $2,061.74 per year and the annual maintenance cost was $1419.01, a total of $3480.75.

THIS LIGHTING SYSTEM was replaced by 91 Westinghouse floodlight projectors mounted at 22 locations. The cost of the new equipment, including installation expense, was $10,500.

THE ANNUAL POWER and maintenance expense of the new lighting is $1284.04, a saving of $2196.71.

IN OTHER WORDS the saving in cost of power and maintenance will pay for this installation in less than five years.

NOT ONLY THAT, but while the approximate foot candle intensity of the old lighting system was only .04 foot-candles, that of the new system is .51 foot-candles.

IF YOU HAVEN'T ALREADY seized upon this opportunity to effect economy in operation, let our engineers study your problem and make recommendations. Call our nearby office. It's our business to help you.

Westinghouse Lighting Specialists will help you plan an effective lighting system

Westinghouse

WESTINGHOUSE ELECTRIC

T 31910

Install ARMCO Culverts Without Disturbing Roadbed . . . Without Delaying Traffic

by the ARMCO Jacking Method

TRAFFIC delays caused by culvert installations on railroads are eliminated by the modern Armco Jacking Method. In no way does it impair the roadbed foundation. *It works beneath it.*

The Armco Jacking Method, employed in the installation of Armco Culverts, means quick completion of the job at a minimum of trouble and expense. Costs are from 30 to 50 per cent less than the estimates of alternative methods.

Furthermore, it means a job free from inspections and repairs for many years, because culverts of Armco Corrugated Iron Pipe have proved their exceptional durability by 25 years continuous service in the ground to date. *Armco culverts last!*

To keep traffic moving and do better work at less cost, use the Armco Jacking Method, an Armco development. Let us send you the latest engineering facts on this modern method of culvert placement. Write today for catalog R-7.

Armco culverts and drains are manufactured from the Armco Ingot Iron of The American Rolling Mill Company and always bear its brand

ARMCO CULVERT MANUFACTURERS ASSOCIATION, *Middletown, Ohio*

This 36-inch Armco Paved Invert Culvert was jacked into place under a main line railroad in Southwestern Ohio, without interference to traffic.

The Latest Achievement

IN GENUINE WROUGHT IRON IS BENDABILITY!

For a long time railroad men have said, "We know what wrought iron pipe will do in resisting corrosion and vibration-fracture—if it only had greater bending qualities!"

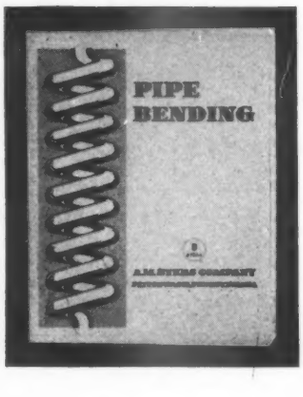
This statement—and hope—was a challenge to us. All the resources of our organization responded. After research, experiment and actual performance tests, it is here—Byers Wrought Iron Bending Pipe!

In the first place, this pipe embraces all the regular qualities of Byers Genuine Wrought Iron Pipe.

In addition—and vitally important—the bendability of this pipe is amazing. Railroad men have written us reciting results which exceed our own claims for this bending pipe.

Until you have experienced how efficiently this pipe solves the problem of installations requiring difficult hand or machine bending, frankly we hesitate to advance all our claims, every single one of which is a fact! What we want you to do is this: write us today—to send you our Bulletin No. 50. It is a complete chapter on pipe-bending. For you it is an introduction to greater economy, greater service—and less trouble in pipe installations. A. M. Byers Company, Pittsburgh, Pa. Established 1864.

SEND FOR A COPY



BYERS GENUINE WROUGHT IRON BENDING PIPE

GRIFFIN

WHEEL CO.

SINGLE PLATE
CHILLED TREAD CAR WHEELS

Deep, uniform wearing chill on GRIFFIN SINGLE PLATE WHEELS guarantees to the user longer life and negligible removals for worn through chill.

The Food Supply of The Nation is Carried on
Chilled Tread Wheels

PLANTS

Chicago
Boston
Cleveland
Detroit
Cincinnati
Council Bluffs
Kansas City
St. Paul
Denver
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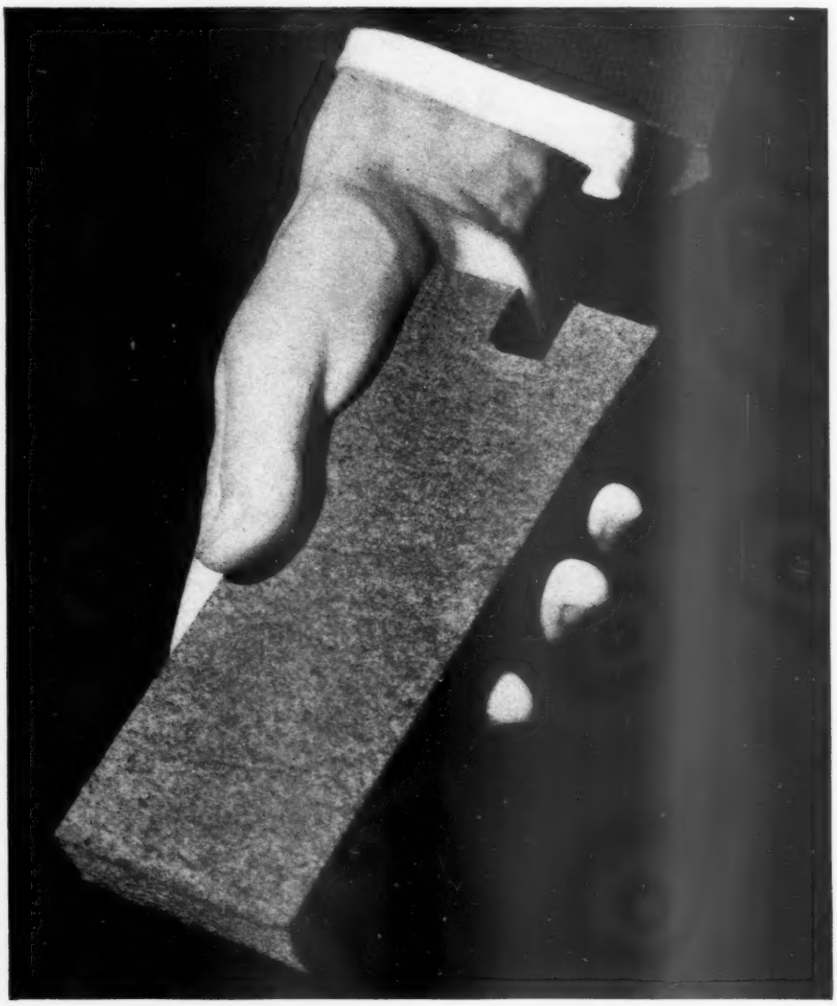
Los Angeles
Tacoma

THIS Wick reduces Maintenance in the Fafnir-Melcher Box



DIRT may get into the lubricating oil, but it can never reach the bearings in a Fafnir-Melcher Journal Box. A wick draws the oil from a well in the journal housing and strains every drop that is wiped from the wick by the axle.

The oil is then whirled into the roller path, carried across the rollers by the spiral grooves and returned to the oil well. Not only is the lubricant cleaned by this exclusive Fafnir-Melcher feature but the proper quantity of oil is assured regardless of temperature, train speed and other variable conditions.

Longer life with less maintenance is the direct result of wick lubrication. The rugged simplicity of the Fafnir-Melcher design adds strength. Shocks and noises arising from the inevitable pounding on the wheels are absorbed by a non-metallic insulating pad between the equalizer and the bearing.

Performance records, covering many hundred thousand miles on America's leading railroads are convincing evidence of the true value of Fafnir-Melcher design. This data is freely offered to those who are interested in reducing the cost of operation and maintenance. A letter will receive our immediate attention.

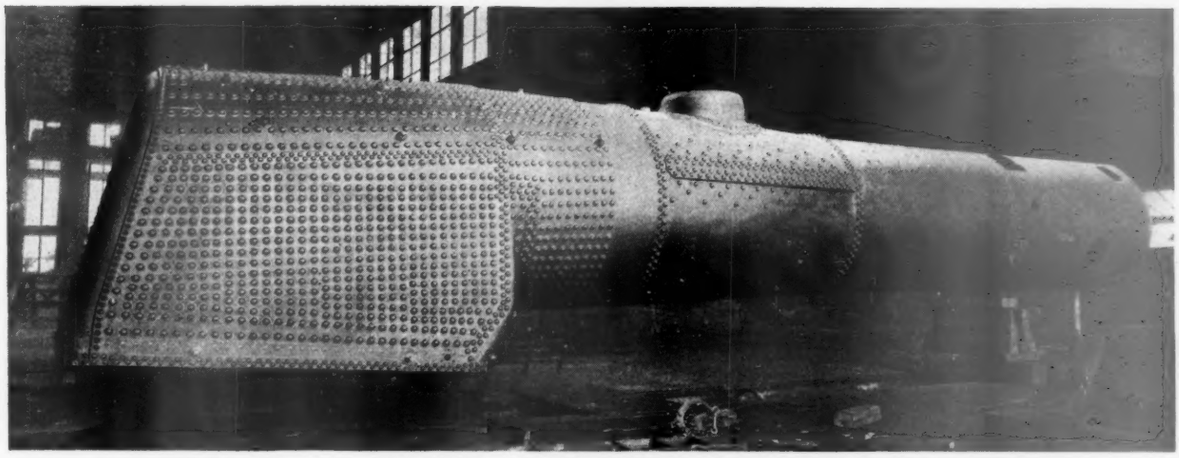
Every requirement fulfilled

1. *Ample capacity to carry all loads without heating.*
2. *Positive lubrication at all speeds and temperatures.*
3. *Lateral adjustment possible when made necessary by truck wear or distortion.*
4. *Insulation from shocks and deadening of noise.*
5. *Interchangeability with A. R. A. equipment.*
6. *Simplicity of installation and maintenance.*

FAFNIR-MELCHER Roller Bearings for Car Journals

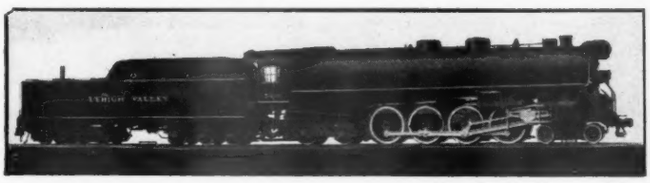
FAFNIR BEARINGS INCORPORATED

General Sales Office and Factory—New Britain, Conn.
Western Service Div.—39 S. Clinton St., Chicago, Ill.



Nickel Steel Boiler and fire box for one of Lehigh Valley 5200 series locomotives. Mfd. by AMERICAN LOCOMOTIVE CO., New York, N. Y.

NICKEL ALLOY STEEL BOILER PLATE FOR NEW 4-8-4 TYPE LEHIGH VALLEY LOCOMOTIVES



The new 5200 series 4-8-4 type locomotives built for the Lehigh Valley Railroad by the American Locomotive Co. exemplify the latest improvements in modern locomotive design. Operating at a boiler pressure of 255 lbs., these new powerful and efficient locomotives have Nickel Steel boiler and fire box plates. • The selection of Nickel Alloy Steel for important locomotive parts is in accord with the most modern practice. Performance results on leading railroads of the United States and Canada have invariably demonstrated that Nickel Steel "performs better longer". • Our technical files contain a wealth of data compiled from the experience of numerous fabricators and users of Nickel Alloy Steel in railroad equipment. You are invited to communicate with our staff of engineers for detailed information relating to your problems.

THE INTERNATIONAL NICKEL COMPANY, INC., 67 WALL STREET, NEW YORK, N. Y.

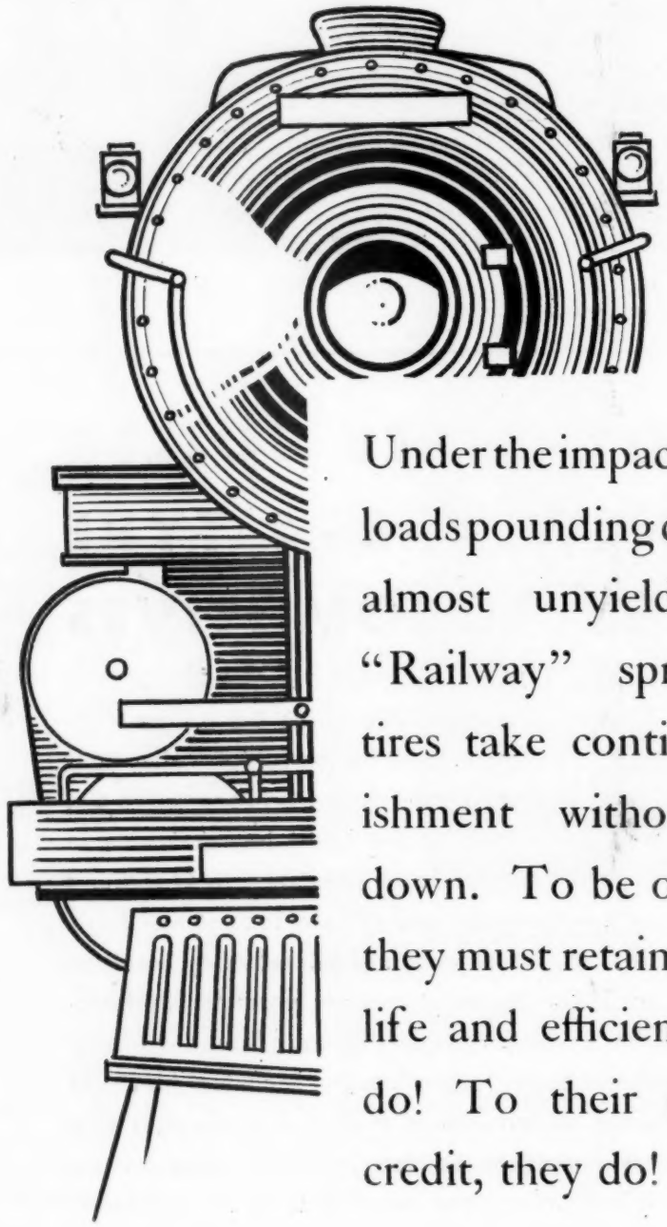
Miners, refiners and rollers of Nickel . . . Sole producers of Monel Metal

INCO NICKEL

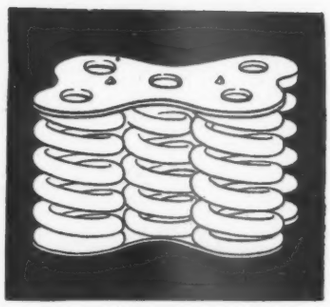
Send for "Recommended Railroad Specifications on Nickel Alloy Steel."

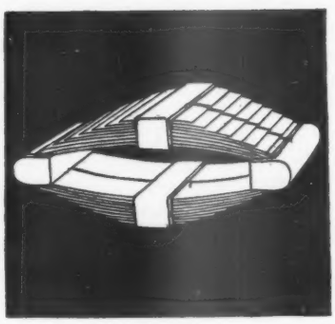
Nickel
ALLOY STEEL
PERFORMS BETTER LONGER

WITHSTANDING THE RIGORS OF MODERN RAILROAD OPERATION



Under the impacts of heavy loads pounding down upon almost unyielding rails, "Railway" springs and tires take continual punishment without letting down. To be of any use, they must retain their long life and efficiency. They do! To their everlasting credit, they do!



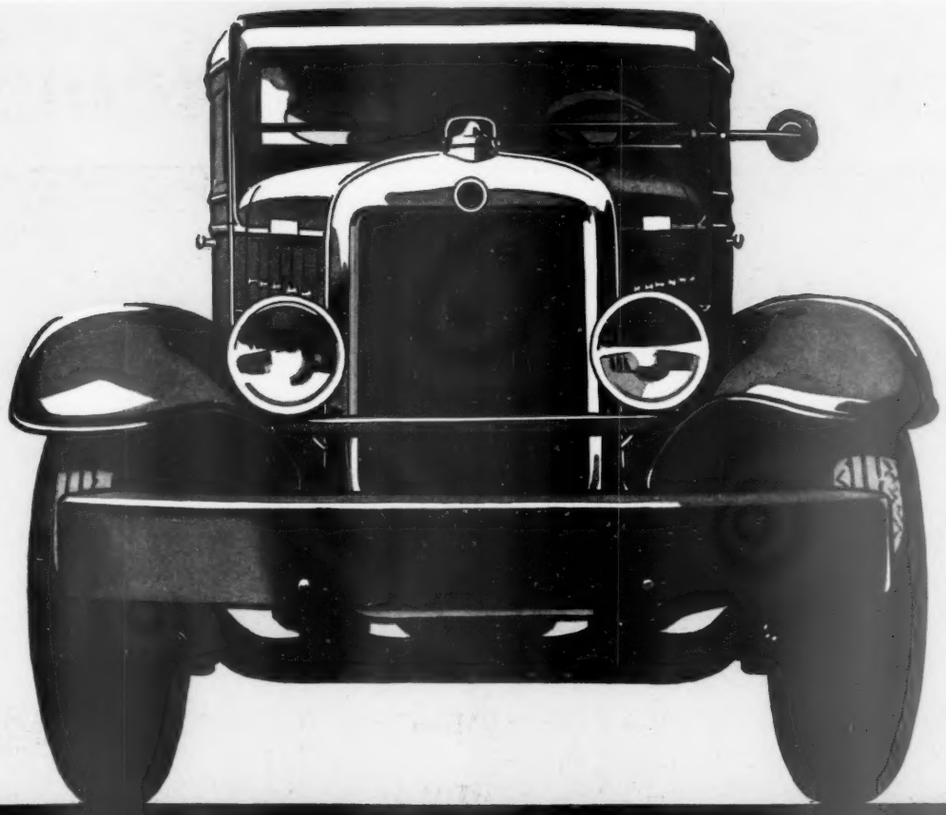


Railway Steel-Spring Company

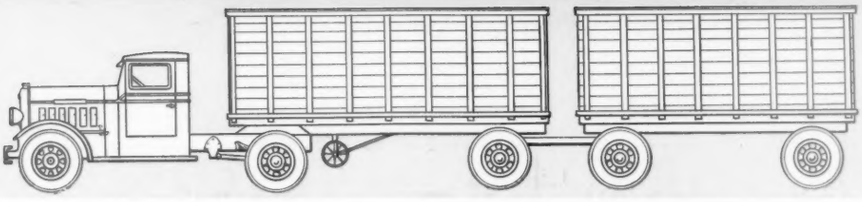
30 CHURCH ST., NEW YORK

Branch Offices:

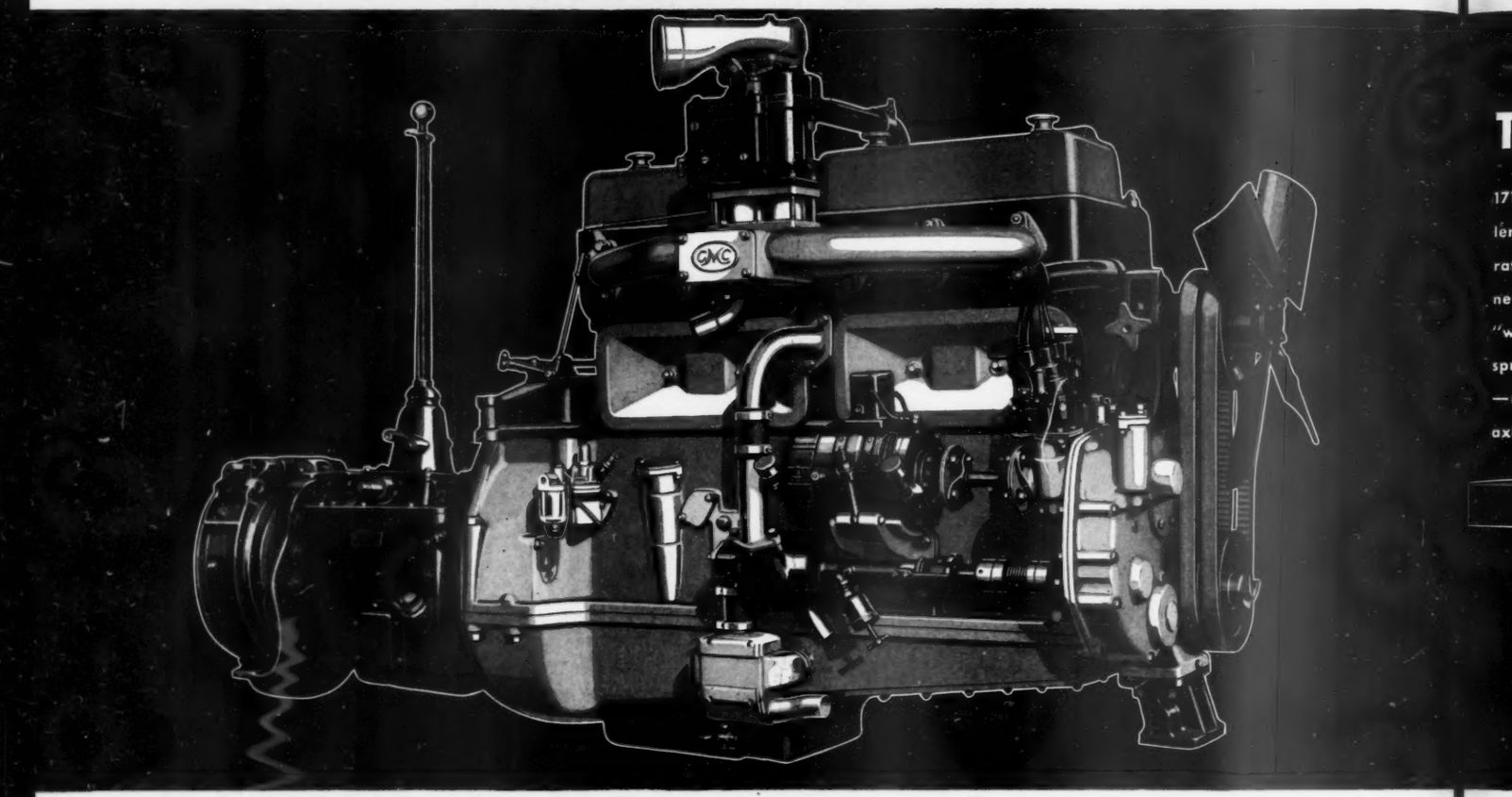
Chicago, Ill.	Detroit, Mich.	St. Louis, Mo.	Pittsburgh, Pa.	Montreal, Que.
St. Paul, Minn.	Washington, D. C.	Cleveland, Ohio	Denver, Colo.	San Francisco, Cal.



GENERAL MOTORS
SUPER HEAVY DUTY
TRUCKS
and
NEW TRUCK-BUILT
TRAILERS



GENERAL MOTORS SUPER



IN TRUCKS . . . IT'S TORQUE THAT COUNTS

● General Motors Trucks are powered to meet every occasion. Their six-cylinder engines develop up to 150 horsepower and provide torque up to 450 foot-pounds.

That means ample torque—for pulling capacity loads out of soft, rough ground—for conquering grades—for moving payloads all day long at highway speeds.

And General Motors Trucks are as sound and dependable as they are powerful. Designed as a unit from radiator to rear axle—every part proved and road-tested by the same engineering organization—General Motors Super Heavy-Duty Trucks afford full ability to utilize the power of their mighty engines.

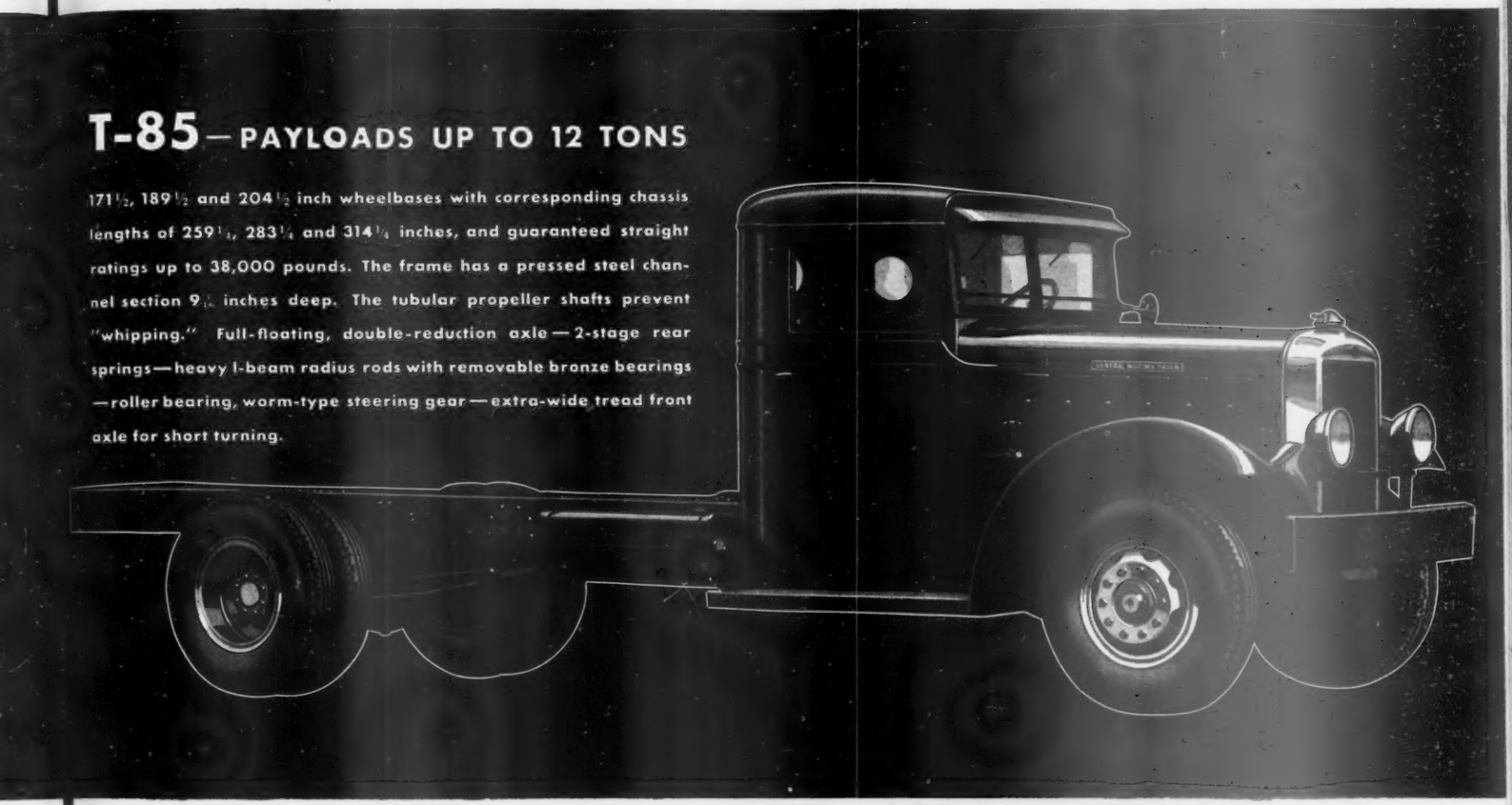
The combined resources of the General Motors Corporation, its broad automotive experience, its extensive research facilities were at the command of General Motors Truck engineers in developing these mighty engines. "Zero-lash" hydraulic slack adjusters automatically maintain correct valve adjustment. Lubricating oil is forced to all main, connecting rod, wrist-pin, and valve rocker arm bearings. Two-stage oil pump with oil cooler keeps viscosity range of lubricant more nearly constant. Oil by-passed around cooler when cold. Air cleaner, of the triplex oil reservoir type, prevents dirt from reaching combustion chambers under all operating conditions.

GENERAL MOTORS TRUCK BUILDS TRUCKS AND

ER HEAVY-DUTY TRUCKS

T-85—PAYLOADS UP TO 12 TONS

171½, 189½ and 204½ inch wheelbases with corresponding chassis lengths of 259¼, 283¼ and 314¼ inches, and guaranteed straight ratings up to 38,000 pounds. The frame has a pressed steel channel section 9¼ inches deep. The tubular propeller shafts prevent "whipping." Full-floating, double-reduction axle—2-stage rear springs—heavy I-beam radius rods with removable bronze bearings—roller bearing, worm-type steering gear—extra-wide tread front axle for short turning.



T-95—PAYLOADS UP TO 15 TONS

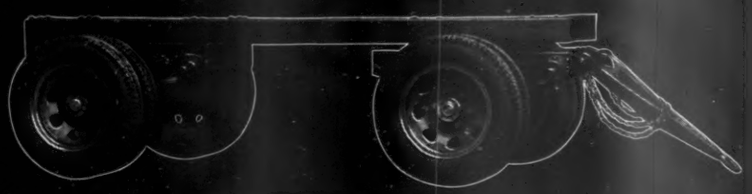
his truck has a massive 9¼ inch frame with 4 inch flanges hat can't buckle—an exclusive frame stress absorber that disenses load stresses over a wide area. I-beam radius rods—Westinghouse Air Brakes on all six wheels. Heavy-duty 4-peed truck-type transmission. Full floating tandem axles ith inter-axle differential. Optional rear axle ratios availble to meet all operating conditions. Straight ratings up to 0,000 pounds. *MODEL T-96*, payloads up to 12 tons, having ne driving and one trailing axle. Driving axle, double reduction, full floating type. Straight ratings up to 40,000 pounds. 89½, 204½, 224½ inch wheelbases on both models.

TRAILERS FOR EVERY COMMERCIAL PURPOSE

NEW GENERAL MOTORS TRUCK-BUILT TRAILERS

3 to 20 TONS SEMI-TRAILERS

Semi-automatic for payloads from 3 to 20 tons. Universal fifth wheel adaptable for use with the majority of tractors now in use. Sturdy, narrow frames for elimination of needless weight. Pressed steel cross members, with integral gusset and angle clip construction. Low platforms. BK vacuum, Westinghouse Air, or Warner Electric power brakes available. 5-8 ton type illustrated.

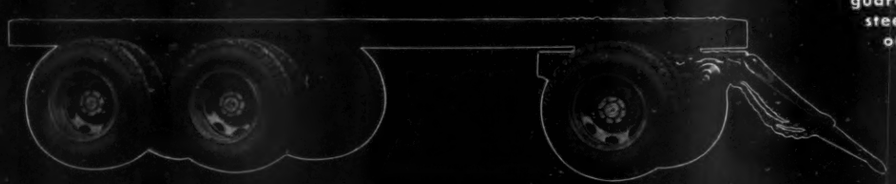


11 to 17 TONS *6-Wheel Trailers*

Sturdy, pressed steel frames with wide flanges. 2½" x 3½" axles. 6-spring suspension with auxiliary springs front and double springs on rear. Spring eyes double wrapped to insure against breakage. Latest type dual pneumatic axle spindles with large bearings. Power brakes are available on tandem or all axles.

3 to 13 TONS *4-Wheel Trailers*

All pressed steel wide flange frame construction giving maximum payload with maximum strength. Exclusive stress absorber at critical points to guard against sagged frames. Electric steel draw bar hinged at extreme outer edges of frame, reducing snaking to a minimum. Forged Spoksteel wheels are standard on all General Motors Truck trailers. Two stage spring construction. Power brakes obtainable on one or both axles.



IN TRAILERS . . . IT'S PAYLOAD THAT COUNTS!

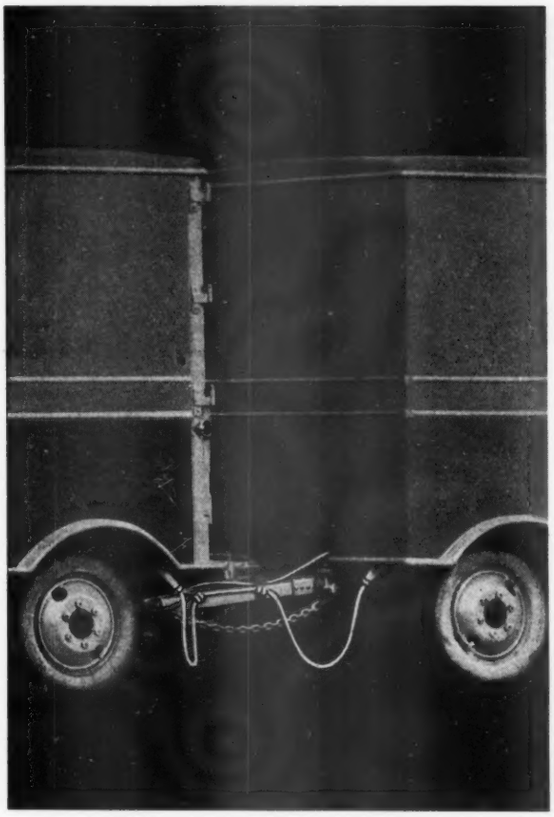
For the first time in truck history, a truck manufacturer provides a complete line of trailers, truck-built, with wheel bearings, hubs, wheels, springs, shackles, brakes and many other vital parts interchangeable with the corresponding parts of their companion trucks and tractors. This feature of interchangeability results in new performance advantages and a unique nationwide service available to operators.

Yet these new truck-built trailers are not confined to use with General Motors trucks and tractors. They fit all makes of power units and open up new economies to all truck operators.

Consider the advantages of General Motors Truck design and construction in trailers, the economies of General Motors Truck manufacture that are passed along to you in this complete new line of trailers.

GENERAL MOTORS TRUCK COMPANY, PONTIAC, MICHIGAN

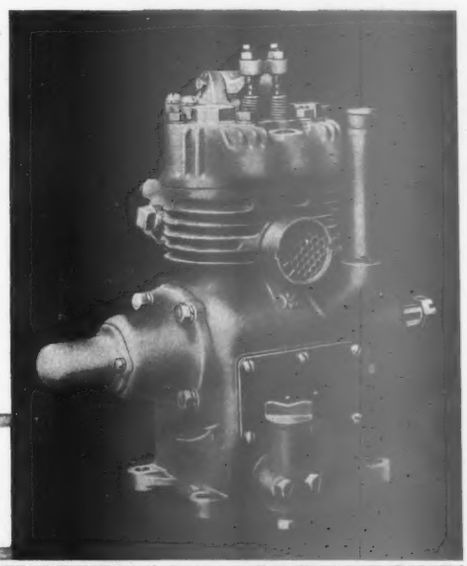
(A Subsidiary of Yellow Truck and Coach Manufacturing Company)



★

BRAKES and the modern TRAILER TRAIN

No need to stress the fact that trailer train operation is a rapidly growing, decidedly economical form of modern highway transportation . . . Likewise there is little necessity to explain the obviously indispensable place brakes by Bendix-Westinghouse hold in the success of this important branch of highway commerce ★ Universally accepted as the standard control for modern heavy-duty transport units, Bendix-Westinghouse Automotive Air Brakes in their unchallenged success are merely maintaining a confidence born of a manufacturing background of more than a half century ★ Lightning quick, powerful, traditionally dependable, Bendix-Westinghouse control is something more than just a brake . . . This modern equipment assures constantly perfect equalization of braking pressures, greatly lengthens periods between adjustments, increases lining life, provides an automatic safety feature in case of a breakaway, at any point, in train operation and makes every truck or tractor a potential trailer carrier ★ Write today for more specific information regarding the countless advantages of modern Air Brake Control . . . Address BENDIX-WESTINGHOUSE AUTOMOTIVE AIR BRAKE COMPANY at Pittsburgh, Pennsylvania.



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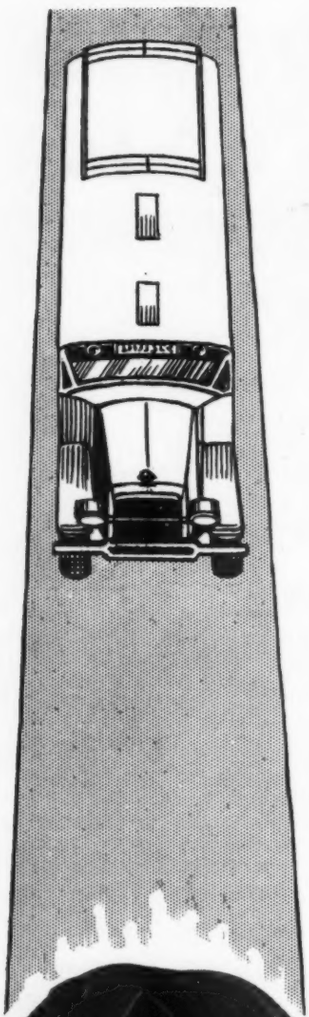
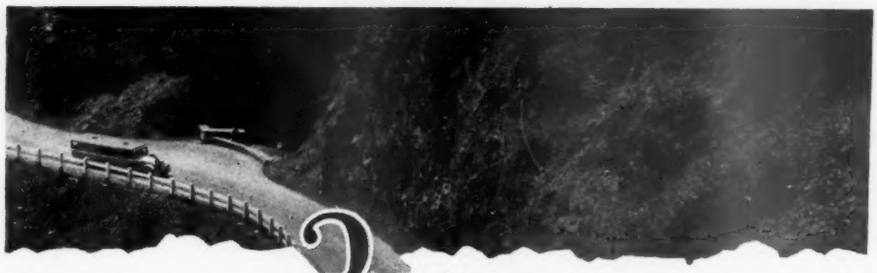
BENDIX ★ WESTINGHOUSE

AUTOMOTIVE ★ AIR ★ BRAKES





What ? Would You As Driver or Passenger Prefer *to have* Answered?

IN an emergency . . . when a quick stop is imperative . . . when a few feet may mean the difference between safety and disaster . . . what is the first question that pops into your mind?

Will the brakes hold? What else would any person think of? For a few tense seconds it becomes the most important question in life.

How are the brakes on your automotive equipment? Can you depend upon them to protect your company against accidents and damage claims?

Why delay your specification of HUNT-SPILLER *Air Furnace Gun Iron* Brake Drums? They insure positive control in any emergency – they always retain that smooth surface necessary for maximum braking efficiency – they will not cut, score or grab and the savings in maintenance will pay you a big return on the investment.

HUNT-SPILLER MFG. CORPORATION
J.G. Platt, Pres. & Gen. Mgr. V.W. Ellet, Vice-President.
Office & Works
383 Dorchester Ave. South Boston, 27, Mass.
Canadian Representative: Joseph Robb & Co., Ltd., 997 Aqueduct St., Montreal, P. Q.
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International Rwy. Supply Co. 30 Church Street, New York, N. Y.

HSGI
Reg. U. S. Trade Mark

Brake Drums
Cyl. Replacement Sleeves
Clutch Plates
Pistons

HUNT-SPILLER GUN IRON

Air Furnace

Earning ability!

THAT'S THE FINAL TEST OF TRUCK VALUE

After all, the final test of a truck's value is its earning ability. Dodge Trucks not only earn—they earn more, for several very definite reasons. » » Typical of Dodge value is the Standard 1½-ton chassis. Its price—only $595 f. o. b. Detroit—calls for but a small investment. Then, because of this truck's many exceptional features, you get greater dependability, ample power, ease of control, speed, safety, economy and long life—all an assurance of maximum earning ability. » » Inspect and test this 1½-ton truck or any of the many other Standard or Heavy-Duty types in the Dodge line. You will find that the experience gained in building over 400,000 quality Dodge Trucks assures you a truck that is precision-built and perfectly balanced part-to-part—a truck that will work and earn for you every mile of its long life.

PAYLOAD CAPACITIES IN THE HEAVY-DUTY LINE RANGE FROM 3,600 TO 11,175 POUNDS—AND UP, FOR TRACTOR AND TRAILER SERVICE. PRICES ARE EXCEPTIONALLY LOW. » » THE STANDARD LINE RANGES IN PAYLOAD CAPACITY FROM 1,200 TO 4,300 POUNDS AND INCLUDES THE 1½-TON CHASSIS AT . . . . . $595 F. O. B. DETROIT

TO HELP LOWER YOUR HAULING COSTS OPERATING RECORD BOOK FREE

DODGE BROTHERS CORPORATION E-42
Detroit, Michigan

Send your Operating Record Book. I understand there is no obligation.

NAME_____

ADDRESS_____

CITY_____ STATE_____

Number of Trucks Operated (*Book for each will be sent*)_____

DEPENDABLE DODGE TRUCKS

Fire

COMPLETE

Cuts Bus Operating

FIRESTONE BUS BALLOONS—provide extra values found in no other tire: 1. Gum-Dipped Cords which minimize internal friction heat and add 58% to the flexing of Firestone Cords. 2. Two extra protective plies under the Tread—26% greater protection against punctures and blowouts. 3. Tougher, wider, deeper-grooved tread—25% to 40% longer tire life and quicker trips through increased speed with safety which assures on-time schedules without delay.

Firestone Tubes

are circular molded to perfectly fit the shape of the tire—no pinching or buckling. Firestone Tubes are built to give extra service under hardest usage.

TIRES • TUBES • BRAKE LINING

Copyright, 1931, The Firestone Tire & Rubber Co.

stone SERVICE

Costs to the Minimum

Firestone New Type Bus Battery

with patented removable terminals and handles, and genuine one-piece hard rubber case, gives you extra power at lowest cost per mile.

Firestone Spark Plugs

eliminate compression and power losses, produce maximum spark. Firestone Spark Plugs are built to S. A. E. precision specifications.

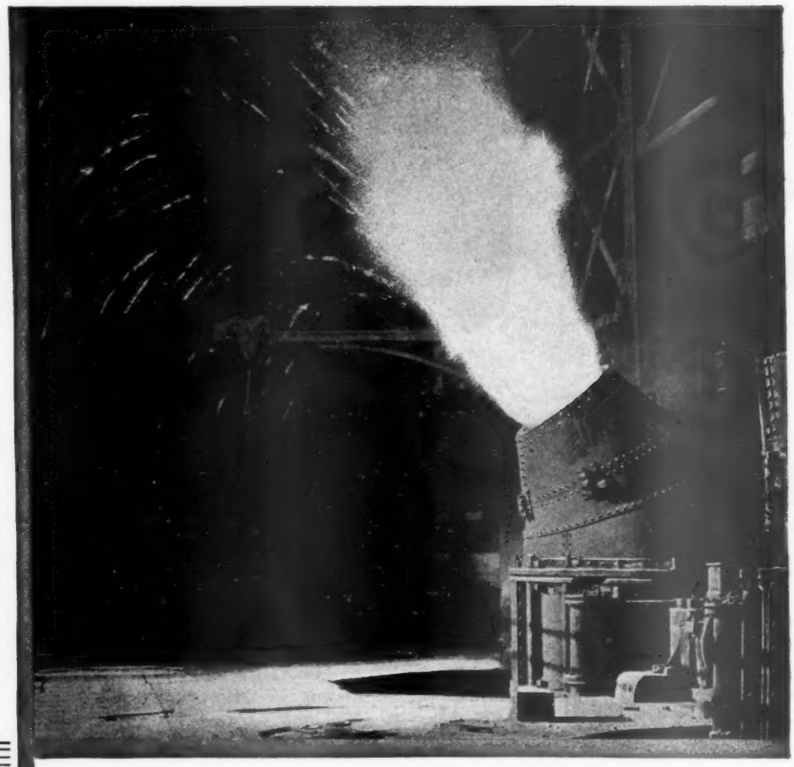
Firestone Bus Blocks

meet every requirement for heavy duty braking with a minimum of wear on equipment.

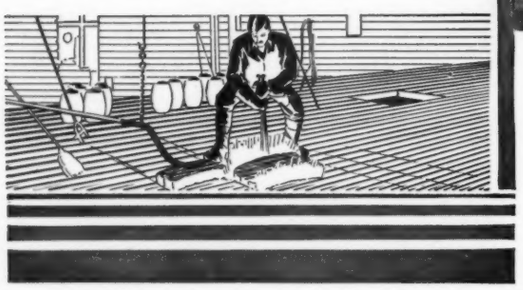
It will pay you well to investigate this *complete* Firestone service—developed through years of close contact and daily experience with the bus industry. Your local Firestone dealer will gladly show you how it starts saving money for you *at once.* See him today and get the benefit of tested equipment and skilled service in cutting operating costs to bed rock! When purchasing new equipment insist on Firestone Balloons, Firestone Tubes, Firestone Rims, Firestone Batteries, Firestone Spark Plugs and Firestone Brake Lining.

Listen to the Voice of Firestone Every Monday Night over N. B. C. Nationwide Network

BATTERIES • RIMS • ACCESSORIES



BESSEMER
solved the heat problem of STEEL



Ethyl solved the pressure problem of *gasoline*

CHEAP STEEL—pooh!" Iron manufacturers poked fun at the idea in 1870. "Give us cheap heat and we'll give you cheap steel," they said. Bessemer did it. Blowing air through liquid metal, he produced *free* heat by natural combustion, and thereby made cheap steel possible.

\+ + +

Fifty years later a like situation confronted the automobile industry. "Find a fuel that will stand higher pressure," said automotive engineers, "and we will give you better automobiles." Ethyl fluid was the answer to this need.

Ethyl fluid controls the combustion of gasoline, making high pressures possible. Manufacturers have taken advantage of this fuel to get the faster acceleration, the increased power, the greater fuel economy, and the cooler combustion that are characteristic of modern high compression bus engines.

Engines that are designed to run on Ethyl Gasoline give performance undreamed of a few years ago. And the end is not in sight. Compression is going higher. More manufacturers will build for Ethyl. Tomorrow's performance will be even greater.

High compression engines offer you a solution to underpowered busses, to faster schedules, to competitive transportation. Ethyl Gasoline is the only fuel to answer their need. It makes *any* car deliver its best performance. Ethyl Gasoline Corporation, Chrysler Building, New York City.

© E. G. C. 1931

The active ingredient used in Ethyl fluid is lead.

ETHYL GASOLINE

THE NEW REO BIG 4 TONNER

A Truck Built to Do YOUR Job

The new Reo Big Four-Tonner is a heavy truck for heavy work, massively constructed at all vital points. It is engineered for *safe* and *profitable* high-speed travel. The Big 4-Tonner engine develops 101 h. p. at the low speed of 2600 R. P. M., has seven big main bearings, full force feed lubrication even to piston pins. The cylinder block of chrome nickel iron increases valve seat and cylinder wall life *seven times*. Built in three wheelbase lengths, from tractor to van types — offered at the lowest price ever placed on a comparably heavy 4-ton truck of equal specifications!

1. Powerful heavy duty, 101 H. P. Six Cylinder Engine.
2. Heavy Duty 4-speed Transmission.
3. Brake Booster standard equipment.
4. Chrome nickel cylinders—wearing 7 times longer than grey iron. Seven bearing crankshaft.
5. Dual wheels standard equipment.
6. Extra long springs; helper springs, standard equipment.
7. Frame reinforced by 7 heavy cross members.
8. Powerful 4-wheel hydraulic brakes.
9. Heavy duty full-floating rear axle.
10. Extra heavy frames. Side channels 10″ deep ¼″ thick, with constant flange width of 3 inches.
11. Available in three wheelbase lengths from tractor to van type.

REO MOTOR CAR COMPANY
LANSING — TORONTO

150-inch wheelbase chassis . . . $2800
170-inch wheelbase chassis . . . $2875
190-inch wheelbase chassis . . . $2950
f. o. b. Lansing

REO BIG 4 TONNER $2800

Good News!

FOR TRAILER OPERATORS

—TIMKEN'S NEW COMPLETE LINE OF TRAILER AXLES WITH STANDARDIZED INTERCHANGEABLE PARTS

If you could build your own trailer axles you'd make sure that as many parts as possible were interchangeable with similar parts of the axles on the trucks which pull the trailers.

That's exactly what Timken has done. It's a big step in the right direction. Think how much simpler your service problems become. Think how much less inventory of service parts you will have to keep in stock.

Mechanically these axles are just what they should be; just what you expect of Timken.

QUALITY—the best, of course; alloy steels, heat treated; axles from which trouble and expense are eliminated.

BRAKES—correctly designed for all types of brakes; correct brake mountings; effective oil seals in hubs, and oil-slingers prevent excess hub lubricant from getting to the brakes.

Brakes are an engineering job, and *essential* on trailers. These axles solve that.

INTERCHANGEABLE PARTS—brake mechanism, hubs, bearings, drums, etc., are identical and interchangeable with the same parts of Timken driving axles—bevel or worm—of the same capacities.

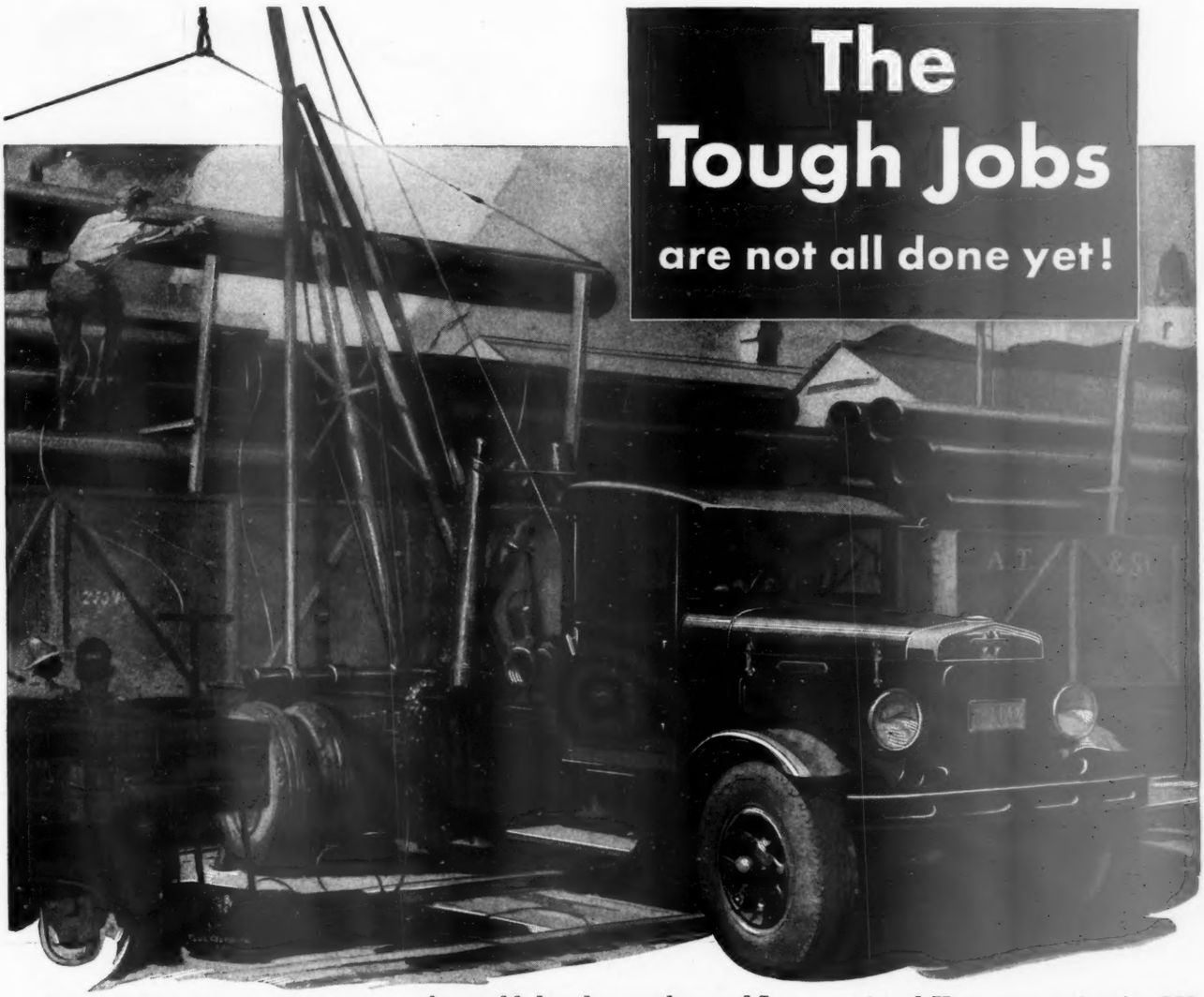
FULL LINE—five sizes, and types for two-wheel or four-wheel semi-trailers, and for four-, six-, or eight-wheel trailers. Designed for application of dual balloon tires.

If you'd like further information write us for literature on the subject.

THE TIMKEN DETROIT AXLE COMPANY, DETROIT, MICHIGAN

TIMKEN AXLES

DTA CO



The Tough Jobs are not all done yet!

Internationals are a boon to the pipe-liner; Roy Parkhill owns 72, and Oklahoma Contracting owns 98

The Pioneer Spirit is far from dead, and the tough jobs are not all finished. Tom Jones and Roy Parkhill will tell you that.

These men, respective heads of the Oklahoma Contracting Co. and the Parkhill Truck Co., will tell you that it's a man's job to lay the pipe lines that carry some of the country's great natural resources. They will tell you that a Pipe-Liner must dynamite the hills . . . cross under and over great rivers . . . plow through forests and swamps. No easy roads for him; in fact, no roads at all.

These men will also tell you that a Pipe-Liner on the job likes two things best in the world; hot dry weather, and International Trucks.

For Internationals play a heavy role in this great work. They take on loads of 24-inch steel pipe in 40 to 80-foot sections weighing up to 7,200 pounds . . . and string it along the roughest right-of-way. They haul the materials, too . . . the couplings and the skids and the hot paint. They transport the fence-busters and the muckers and the other crews and gangs of workmen. They do all this in the fair weather a Pipe-Liner loves . . . or in the rainy weather he hates.

The Oklahoma Contracting Co. owns 98 International Trucks. The Parkhill Truck Co. owns 72. Pipe-Liners, Drillers and Trucking Contractors from coast to coast prefer them. And *wherever* these Internationals go, *Service* is always in the field before them! International Harvester maintains 183 Company-owned Branches in the United States and Canada, and there are dealers everywhere.

You need Internationals . . . and International Service. Both will serve you faithfully and economically. Sizes range from ¾-ton to 5-ton, and any branch or dealer will demonstrate any model for you . . . on your own job.

Ask the nearest branch or dealer about the new
1½-ton 4-speed International
$675
and the new 1½-ton
Six-Speed Special
$725
Prices: chassis, f. o. b. factory.

INTERNATIONAL

INTERNATIONAL HARVESTER COMPANY
606 S. Michigan Ave. OF AMERICA (INCORPORATED) Chicago, Ill.

INTERNATIONAL TRUCKS

FASTER!

Accurate Inflation!

The Schrader
REG. U. S. PAT. OFF.
CHUCK GAUGE•

SNAP the chuck clip onto the valve stem —read the gauge—pull the trigger . . . and the correct amount of air is in the tire in a jiffy. No repeated disconnecting and testing. The Schrader Chuck Gauge provides a sure-acting deflating button; handy when you do need it.

Equip your air lines with this dependable new Schrader Chuck Gauge immediately. The time it saves will quickly pay for it. Your regular supply house has it or can get it for you. A. Schrader's Son, Inc., Brooklyn, Chicago, Toronto, London.

(1) The handy trigger-action controls the flow of air from tank to tire.

(2) An accurate Schrader "Direct-Action" Gauge tells the exact air pressure in the tire. Calibrations are in one-pound units from 15 to 70 lbs.

(3) A convenient Deflator Button releases air pressure from the tire when desired.

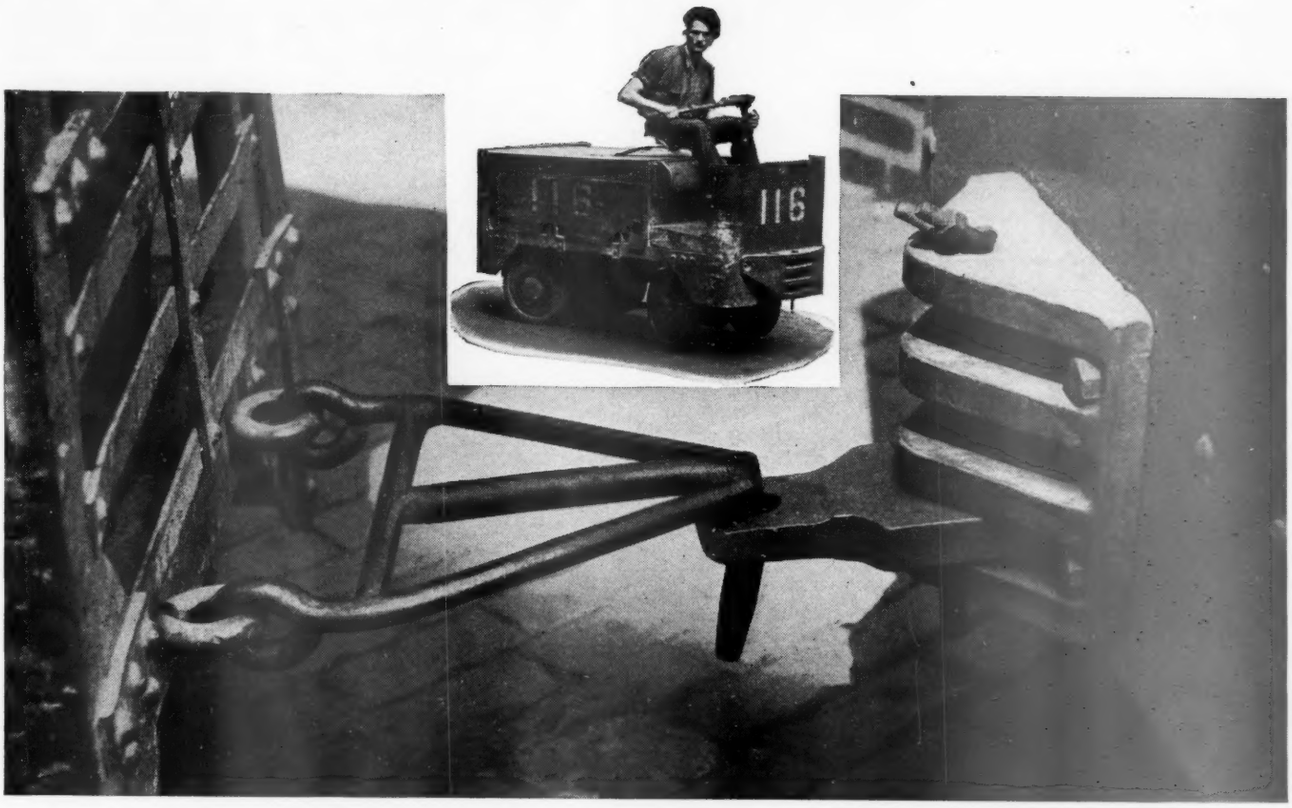
(4) The Schrader Chuck Clip holds the chuck firmly on the valve stem during the process of inflation.

• INFLATES
TESTS PRESSURE
DEFLATES

SAVES TIME! SAVES WORK!

Be sure it's a Schrader-Look for the name

Schrader
Makers of Pneumatic Valves Since 1844
TIRE VALVES TIRE GAUGES



45.8% *less power consumption*

New Goodrich Industrials also speed up hauling...greatly improve drawbar pull

GOODRICH ENGINEERS recently tested a new Goodrich Industrial tire development. Their remarkable findings establish a new high standard of trailer tire performance.

• • •

Two trailers and a tractor weighing 12,320 pounds were equipped with standard, roller type rubber tires and driven over a smooth concrete runway. The tractor's power consumption was checked—found to average 170 watt hours per thousand feet.

Then the tire equipment of the two trailers was changed. Goodrich's new *Low Power* Roller Type Industrials were installed. Trailers and tractor were run over the same route. The tractor's power consumption was checked again. This time it averaged only 92 watt hours per thousand feet. *A saving of 45.8% in power consumption.*

Further tests revealed other outstanding advantages in these new Goodrich Industrials. *They increased the rolling speed of the trailers 28.9%—showed 2.6 times the resiliency of trailer tires heretofore accepted as standard—outwore these old type tires by a wide margin.*

In another test the contrast with steel wheels was even greater. For example, Goodrich Low Power Industrials were found to give *172% improvement in starting, or drawbar pull under identical operating conditions.*

Now, more than ever, insist on Goodrich Industrials for your tractors and trailers. The B. F. Goodrich Rubber Co., Akron, Ohio. Pacific Goodrich Rubber Co., Los Angeles, Calif.

Why

GOODRICH?

1. CUSHION. Goodrich Industrials greatly reduce vibrations in trailers and cut load breakage losses — minimize floor wear.

2. LESS POWER CONSUMPTION. A smooth, specially compounded, even wearing, "free rolling" tread.

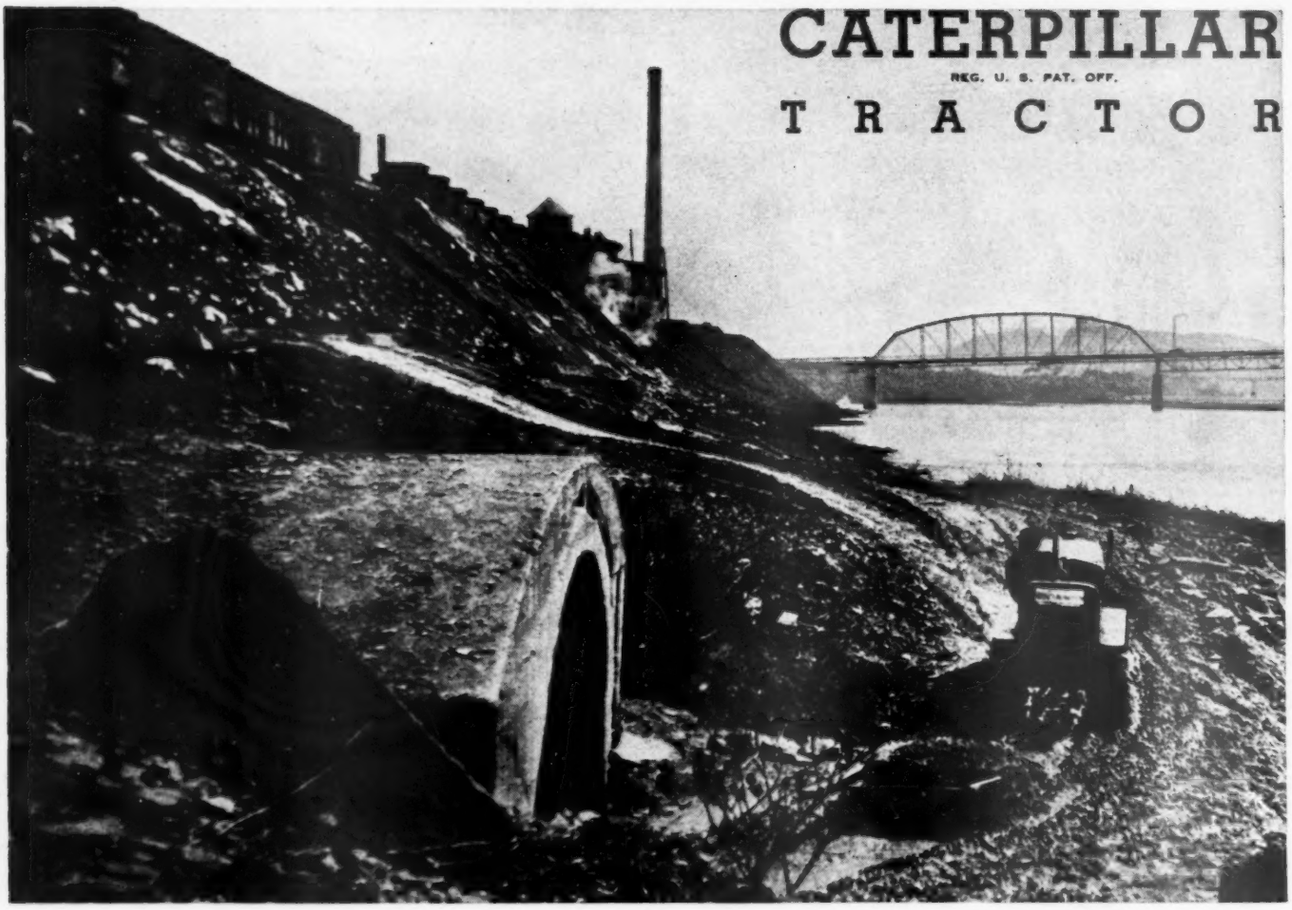
3. TRACTION. Goodrich Industrials minimize creeping of trailers when rounding sharp turns.

4. REPLACEMENTS. Easily made without scrapping old wheels.

5. CAPACITY. Built to carry rated capacity load with greatest efficiency.

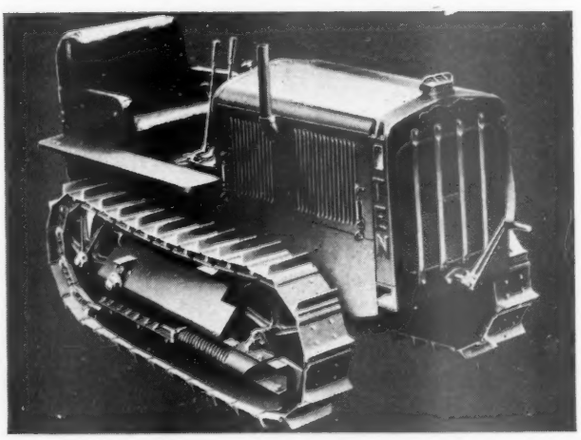
Goodrich *INDUSTRIAL TIRES*

SPECIFY GOODRICH



The "Caterpillar" cleans a CULVERT

THIS 432-foot culvert on the Pennsylvania Lines needs cleaning every few years. This year the job was done with a "Caterpillar" Ten Tractor and a ½-yard scraper — men, money and minutes were saved. Constantly, railroad men are finding new ways to employ the power of this versatile tractor on countless jobs of construction and maintenance — earth-moving, mowing weeds, plowing fire-breaks, pulling ties, providing power for tractor-mounted winches, booms, air compressors. There's a job, perhaps many jobs, on your road that "Caterpillar" Tractors can do better, quicker, cheaper.



Caterpillar Tractor Co.

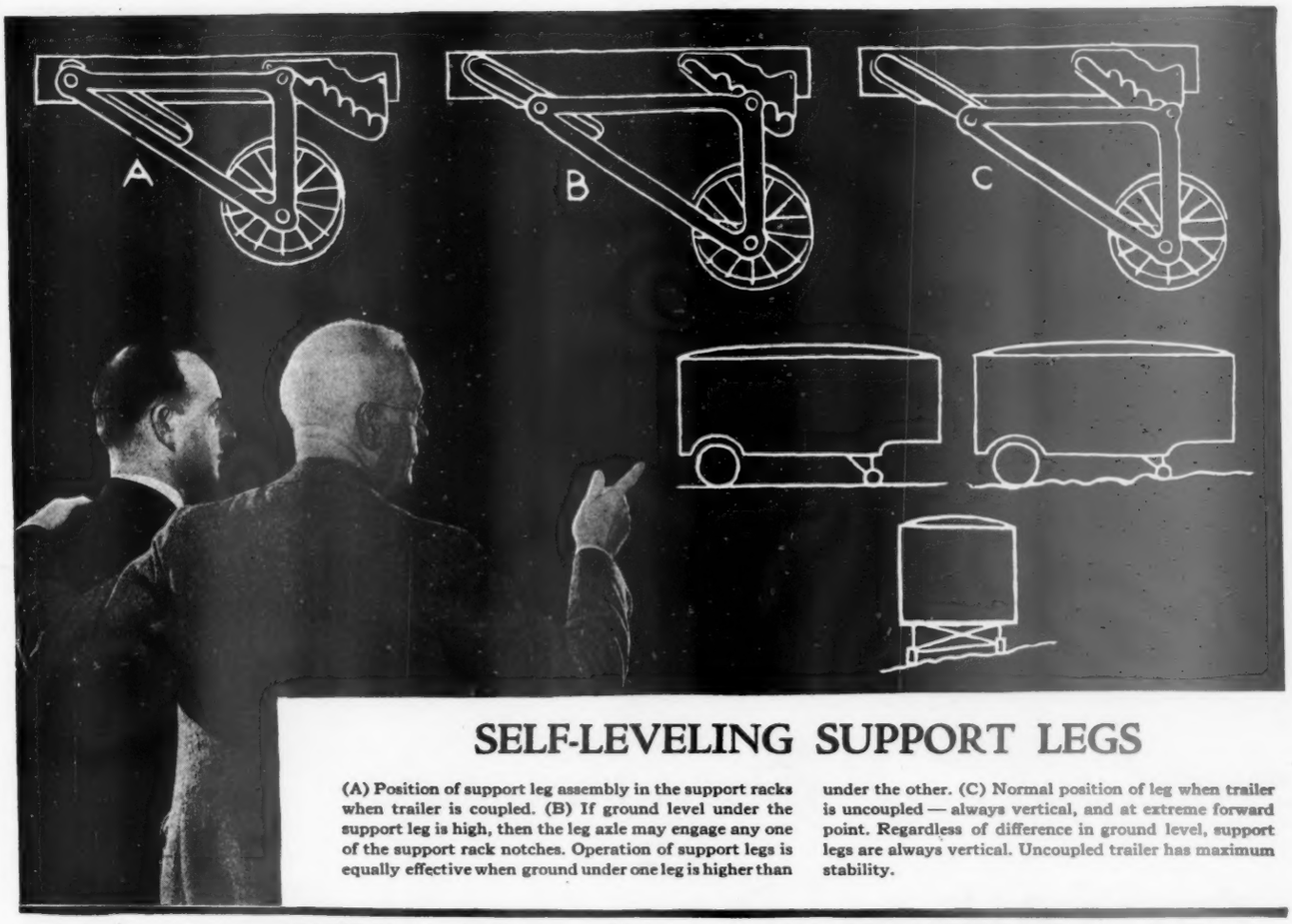
PEORIA, ILLINOIS, U. S. A.

Track-type Tractors Combines Road Machinery

(There's a "Caterpillar" Dealer Near You)

Prices—f. o. b. Peoria, Illinois

TEN	$1100	TWENTY	$1900
FIFTEEN	$1450	THIRTY	$2375
		SIXTY	$4175



SELF-LEVELING SUPPORT LEGS

(A) Position of support leg assembly in the support racks when trailer is coupled. (B) If ground level under the support leg is high, then the leg axle may engage any one of the support rack notches. Operation of support legs is equally effective when ground under one leg is higher than under the other. (C) Normal position of leg when trailer is uncoupled — always vertical, and at extreme forward point. Regardless of difference in ground level, support legs are always vertical. Uncoupled trailer has maximum stability.

PROFITABLE AUXILIARY TRANSPORTATION

ASK leading railroads. They know from actual experience that the Lapeer-Trailmobile system is absolutely essential to complete auxiliary freight transportation. Thoroughly economical. Highly efficient, adaptable, safe, automatic, reliable. Fully developed and widely proven, it embodies a combination of the most advanced improvements. Each and every one is a contributing factor in effecting the greatest possible savings in ton-mile or unit-merchandise-mile costs. Self-leveling support legs (see above) is one of these outstanding features. A demonstration will show you the others — also show you how you can cut haulage costs and increase net profits. Write to The Trailer Company of America, Oakley, Cincinnati, Ohio.

Representatives in all principal cities

Depends upon this Modernized Equipment

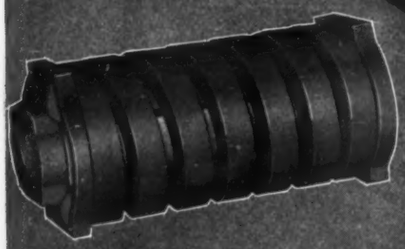
Lapeer-Trailmobiles cut haulage costs for the Boston and Maine Transportation Co.

LAPEER-TRAILMOBILE

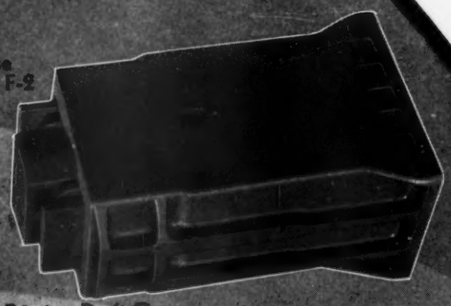
"TRAILERIZE AND ECONOMIZE"

100% CAB CONTROL . . . CHEAPER . . . FASTER . . . SAFER

Cardwell and Westinghouse Draft Gears are made in sizes, capacities and designs to fit any new or old car, or locomotive.



Cardwell Westinghouse Friction Draft Gear Type F-2

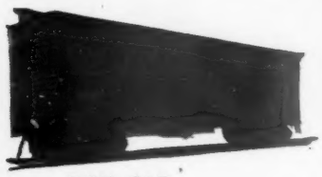


Westinghouse NY-11-D Friction Draft Gear

Cardwell L-25 Friction Draft Gear

PASSENGER

AUTOMOBILE



BOX CAR

REFRIGERATOR

FLAT CAR

GONDOLA

TANK CAR

CABOOSE

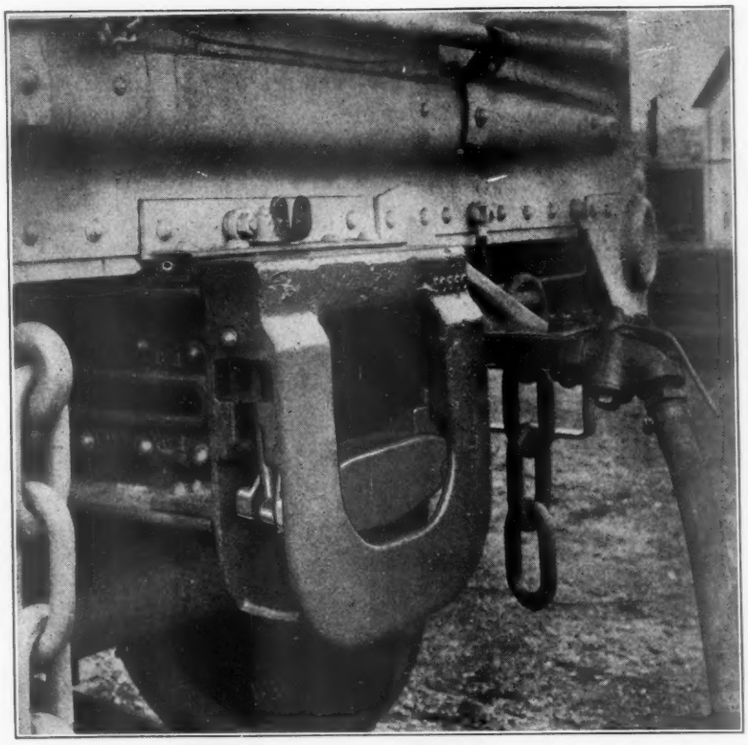
ORE CAR

Sustained Protection Reduces car maintenance costs

Let us explain the new developments which enable Cardwell and Westinghouse Draft Gears to retain their initial high capacity throughout their long life. » »

CARDWELL WESTINGHOUSE CO.
332 South Michigan Avenue
Chicago, Illinois

CARDWELL AND WESTINGHOUSE DRAFT GEARS Fulfill All A.R.A Requirements



Excess Friction

Sharp flanges and excessive side friction at the rail are very common. Much can be done to relieve this condition by using the Union Centering Device. It eliminates the frictional side thrust of the coupler shank.

UNION METAL PRODUCTS COMPANY

NEW YORK-CHICAGO
ST. LOUIS · WASHINGTON · RICHMOND
SAN FRANCISCO · KANSAS CITY
HOUSTON · MONTREAL

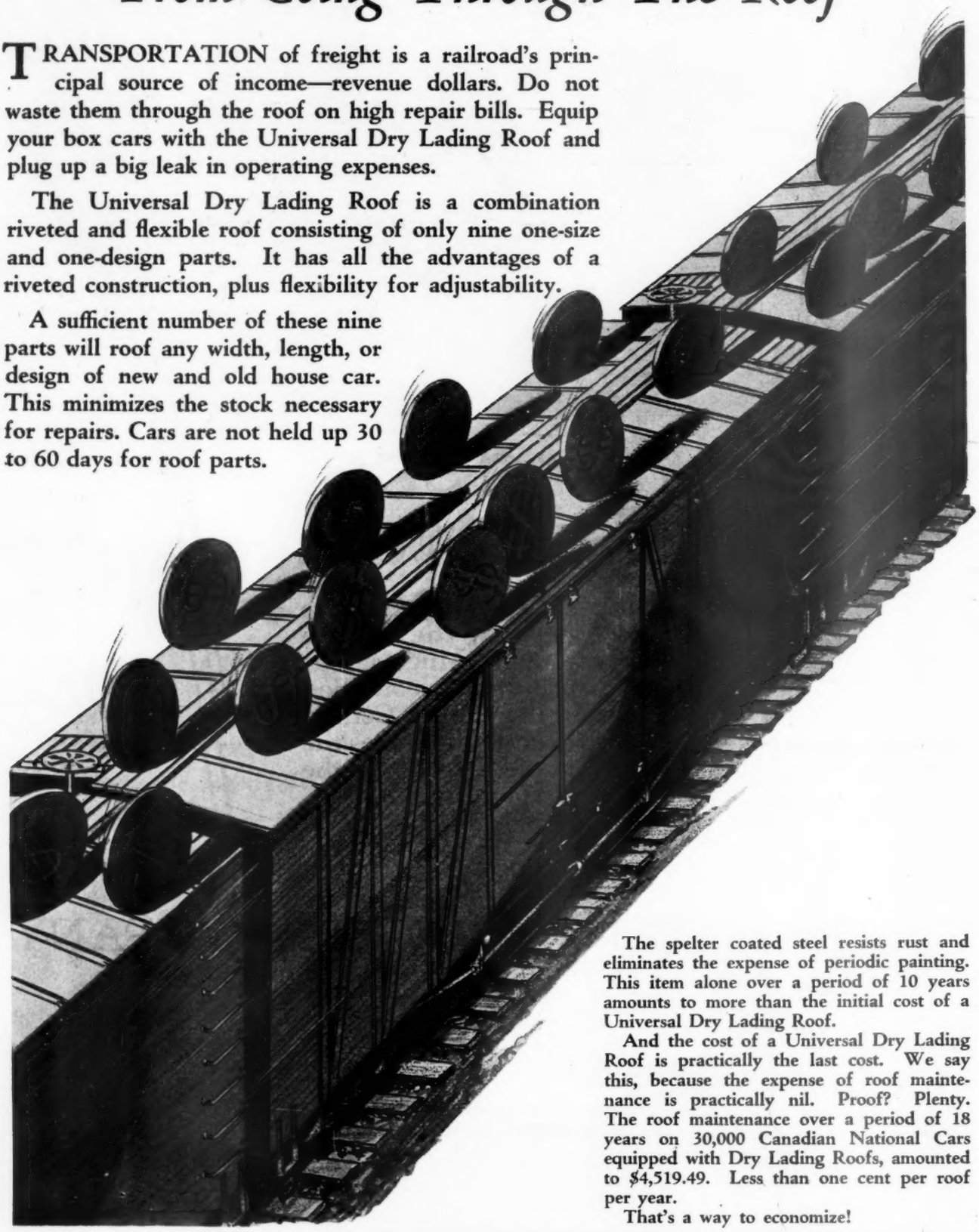
KEEP YOUR REVENUE DOLLARS

From Going Through The Roof

TRANSPORTATION of freight is a railroad's principal source of income—revenue dollars. Do not waste them through the roof on high repair bills. Equip your box cars with the Universal Dry Lading Roof and plug up a big leak in operating expenses.

The Universal Dry Lading Roof is a combination riveted and flexible roof consisting of only nine one-size and one-design parts. It has all the advantages of a riveted construction, plus flexibility for adjustability.

A sufficient number of these nine parts will roof any width, length, or design of new and old house car. This minimizes the stock necessary for repairs. Cars are not held up 30 to 60 days for roof parts.

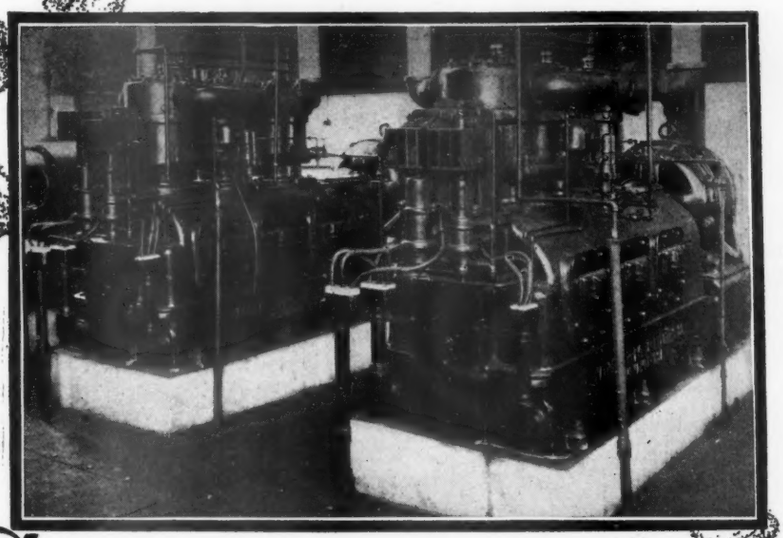


The spelter coated steel resists rust and eliminates the expense of periodic painting. This item alone over a period of 10 years amounts to more than the initial cost of a Universal Dry Lading Roof.

And the cost of a Universal Dry Lading Roof is practically the last cost. We say this, because the expense of roof maintenance is practically nil. Proof? Plenty. The roof maintenance over a period of 18 years on 30,000 Canadian National Cars equipped with Dry Lading Roofs, amounted to $4,519.49. Less than one cent per roof per year.

That's a way to economize!

Hutchins Car Roofing Company



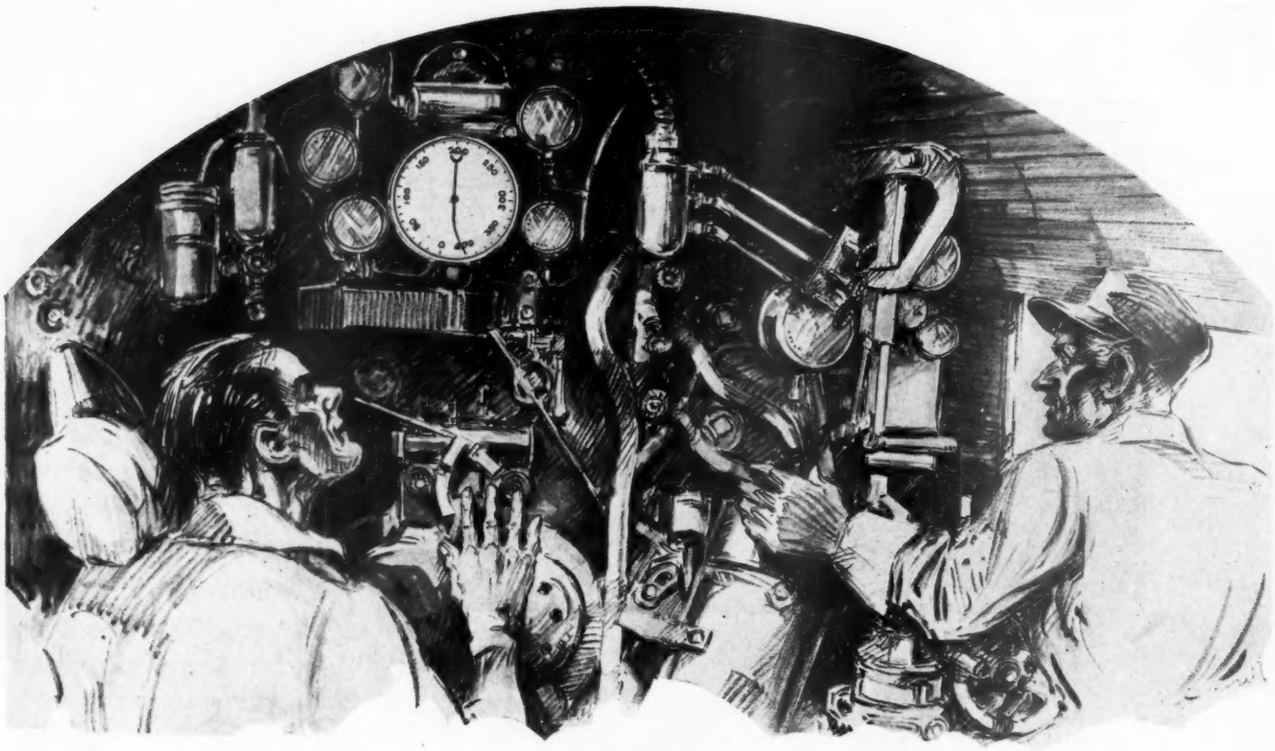
A "baker's dozen" in AIR COMPRESSOR VALUE

JUST as the old time baker threw in an extra bun for good measure, so the builders of Westinghouse-National Air Compressors add extra value to the machines they build .... They save valuable space for the user by designing compact machines that are driven direct by the motor or through efficient herring-bone gearing . . . they save installation cost by making complete self-contained machines that need no elaborate foundation nor require extensive auxiliary apparatus . . . they save operating expense by providing complete Automatic Control of distinctive type—which insures that the power consumed will be in proportion to the air compressed . . . they save maintenance expense by building durable machines that will operate for a score of years with minimum time and material for attention and upkeep—thus maintaining the noteworthy tradition of "Quality Machines for Quality Service" . . . Sizes range from 2½ to 700 cu. ft. displacement—for shops, yards, car retarders, signals, etc.

WESTINGHOUSE AIR BRAKE CO.

General Office and Works · **Wilmerding, Pa.**

WESTINGHOUSE—NATIONAL AIR COMPRESSORS

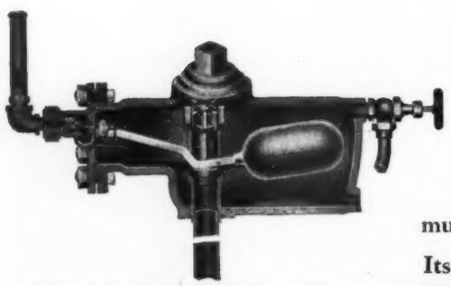


Just as Important as the Safety Valve

NOT merely from the standpoint of safety—to prevent boiler explosions—but, also to insure maximum efficiency from each unit the

CLEVELAND *float* Low Water Alarm

must be considered as a vital necessity not just another accessory.



The CLEVELAND Float LOW WATER ALARM warns enginemen of false water levels—of plugged water columns in time to prevent one of the most horrible disasters that can happen on any road.

Its presence on the locomotive inspires confidence—enginemen know they are taking no chances of forgetting. They do not have to allow a "factor of safety" in maintaining water levels. The CLEVELAND *Float* Low Water Alarm takes care of that safety factor automatically.

Naturally the water will be carried at a level which insures best operating results and lowest maintenance costs.

Barco Manufacturing Co.

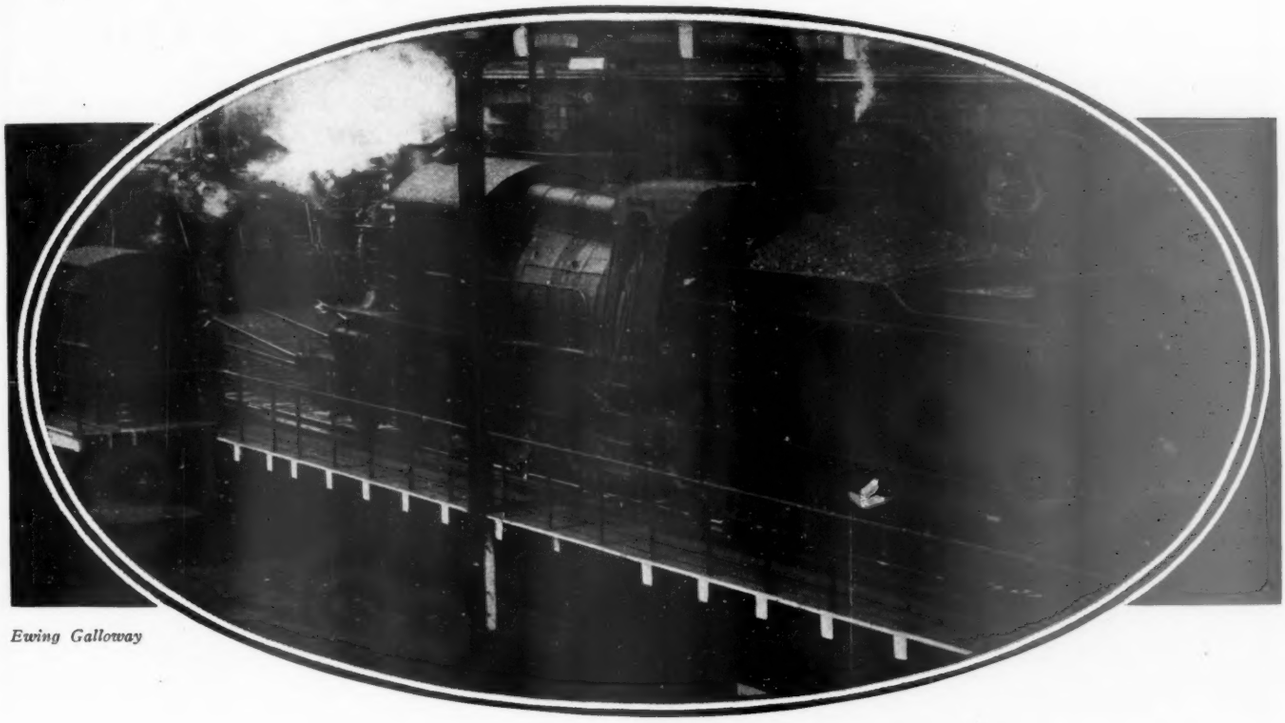
1801 Winnemac Avenue, Chicago, Illinois

THE HOLDEN CO., LTD.

In Canada
Montreal—Moncton—Toronto

In Canada
Winnipeg—Vancouver

BARCO



Ewing Galloway

READY FOR SERVICE

Tires
Rolled
Wheels
Steel Tired
Wheels
Forgings
Steel
Castings
Billets

EITHER returning to the round house after a hard run or just starting out, the locomotive equipped with ''Standard'' Forgings and "Standard" Q.T. wheels is ready for service. It is apt to spend fewer days in the repair shops and more days in service than it would otherwise. Specify "Standard" parts for the maximum relief from maintenance.

STANDARD STEEL WORKS COMPANY

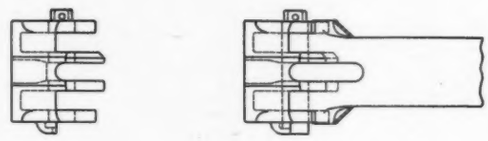
GENERAL OFFICES & WORKS:
BURNHAM, PENNA.

Chicago New York Philadelphia St. Louis
Akron Portland San Francisco

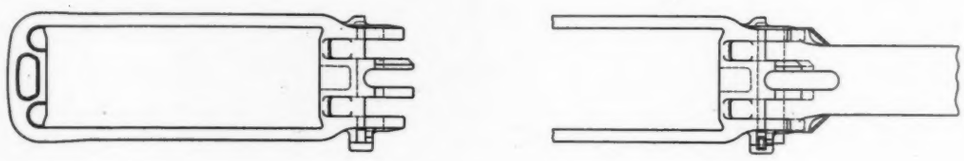
SWIVEL COUPLERS

PROPOSED A R A ALTERNATE STANDARD

WITH BUTT FOR HORIZONTAL YOKE



OR WITH CAST STEEL VERTICAL YOKE



THE McCONWAY & TORLEY CO.

PITTSBURGH, PA.

MAGNUS COMPANY

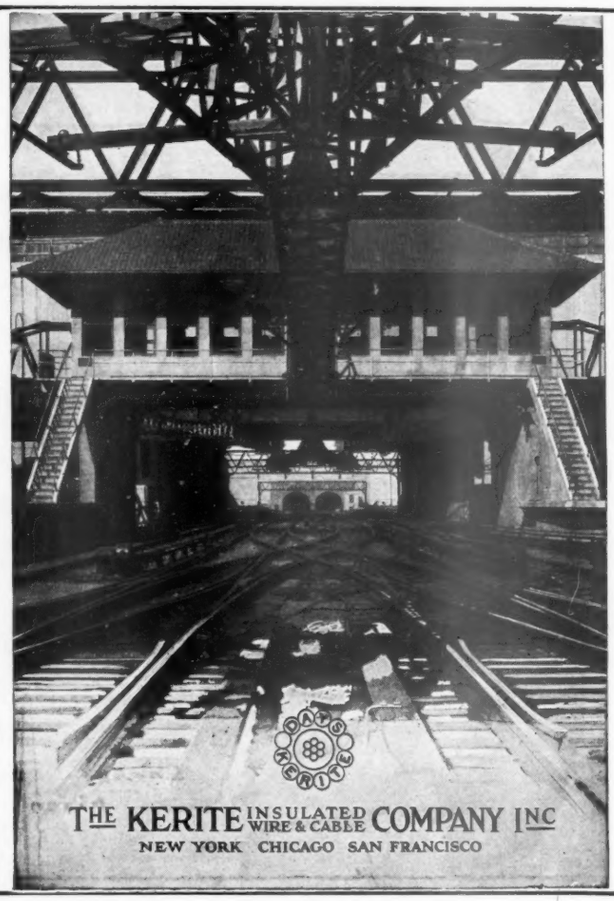
(INCORPORATED)

Journal Bearings

AND

Bronze Engine Castings

New York Chicago



Expensive Repairs

to

Superheater Units

such as building up failed return bends . . . . applying crudely made return bends . . . . butt-welding piping to the units . . . . welding or screwing on machine-made ball ends and return bends . . . . often result in as much as 30 to 40 per cent reduction in the steam area through a superheater unit and tend to destroy the purpose and efficiency of the equipment.

Besides the possibility of reduction in areas and dimensions with its attendant evils, there is the unreliability of such repairs to be considered. Superheater units are subjected to high boiler pressures, high temperature steam and gases, and wide ranges of temperatures, all of which demand equipment in first class condition.

This reduction in superheater efficiency . . . . this uncertainty of equipment in service is expensive in the long run.

The cheapest way is the *"Elesco Way"*—rebuilt, not repaired units.

Example of Improper Unit Repairs, Showing the Obstruction to the Flow of Steam Through the Unit—a 1/3 Reduction in Steam Area.

THE SUPERHEATER COMPANY

60 East 42nd Street
NEW YORK

ELESCO

Peoples Gas Building
CHICAGO

Canada: The Superheater Company, Limited, Montreal

Superheaters *Feed Water Heaters* *Exhaust Steam Injectors* *Superheated Steam Pyrometers*

A-637

BARBER
LATERAL-MOTION DEVICE

1,300,000 cars in service on over 60 Railroads and Car Lines

ROLLER SIDE-BEARINGS

Reduces Friction on Rails 15%
Lessens Wheel Flange Wear

STANDARD CAR TRUCK CO.
McCORMICK BUILDING CHICAGO

THE BUCKEYE STEEL CASTINGS CO.
COLUMBUS, OHIO

Truck Frames
Truck Bolsters
Including
Dalman Types
Draft Yokes
"D" Couplers
Major Couplers

NEW YORK CHICAGO ST. PAUL LOUISVILLE

"Arctic" #36 BRONZE
CAR JOURNAL BEARINGS

LONG WEAR

NO TROUBLE

NATIONAL BEARING METALS CORP.
ST. LOUIS, MO.

New York, N. Y. Jersey City, N. J. Pittsburgh, Pa. Meadville, Pa. Portsmouth, Va. St. Paul, Minn.

2

CAR HEATING

Full 2-inch Steam area
No steam-hose Renewals
Low Maintenance

2-inch End Valves
2-inch Metallic Conduits
2-inch Couplers

VAPOR CAR HEATING CO., Inc.
Railway Exchange Chicago

Six Reasons Why Railroad Men Prefer Ajax Cup Equipment

1 — Ajax Cups are delivered open. Passengers like them because they fit the hand; do not drip, spill, collapse.
2 — Ajax Cups cannot be left standing around to spill on upholstery.
3 — Ajax Cabinets are easy to reload.
4 — Ajax Cabinets are sturdy, unbreakable, trouble-proof.
5 — Ajax Equipment is among the most economical on the market.
6 — Ajax Cup equipment was designed especially to meet railroad needs.

Samples and full information will be sent on request

AJAX
Drinking Cups and Cabinets

UNITED STATES ENVELOPE CO.
Springfield, Mass.
EASTERN CUP DIVISION:
Logan Drinking Cup Co. Div., Worcester, Mass.
WESTERN CUP DIVISION:
Pacific Coast Envelope Co. Div., San Francisco, Cal.

CAMEL
Freight Car Door Fixtures

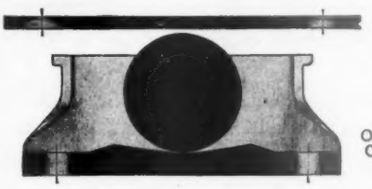
YOUNGSTOWN
Corrugated Steel Freight Car Doors

CAMEL SALES COMPANY 332 South Michigan Avenue CHICAGO, ILLINOIS

Union Spring & Manufacturing Co.

Steel Castings, Coil Springs, Spring Plates
Elliptic Springs, Journal Box Lids
Kensington (All Steel) Journal Box

WORKS — New Kensington, Pa.
PITTSBURGH OFFICE — 2001 Clark Building



STUCKI SIDE BEARINGS
Manufactured by
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Oliver Bldg., Pittsburgh, Pa.
Canadian Representative:
The Holden Co., Ltd.,
Montreal, Can.

UNARCO
Asbestos and Rubber Packings for Railroad Use. Asbestos Insulating Materials
UNION ASBESTOS & RUBBER CO.
310 South Michigan Ave. Chicago, Ill.

Our tests determine the best type of shoe for each type of service
The American Brake Shoe & Foundry Co.
230 Park Ave., New York — 332 So. Michigan Ave., Chicago

THE "FAIR"
RAIL ANTI-CREEPER
THE P. & M. CO.
CHICAGO — NEW YORK
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Staybolt Iron Lewis Special
Solid or Hollow Drilled Staybolts, Lewis Engine Bolt Iron. Also Ryerson Railroad Shop Machinery. Complete stocks of steel for immediate shipment. Write for complete information.
Chicago, Milwaukee, St. Louis, Cincinnati, Cleveland, Detroit, Buffalo, Boston, Philadelphia, Jersey City
Ryerson

Hollow Iron Bars up to 14 ft. long—Solid to 16 ft. Hollow or solid Stays, plain, headed, or headed and threaded.

BUFFALO BRAKE BEAM CO.
—BRAKE BEAMS—
AUXILIARY SUPPORTS FOR BRAKE BEAMS
NEW YORK AND BUFFALO

UNION STEEL CASTING COMPANY PITTSBURGH, PA.
Cast Steel Locomotive Cylinders, Carbon and Vanadium Cast Steel Locomotive Frames, Wheel Centers, Crossheads and General Miscellaneous Castings for Locomotive and Car Work.

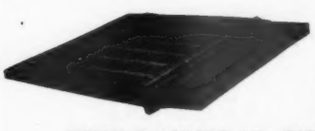
A QUALITY PRODUCT
RESULT OF 40 YEARS EXPERIENCE
TUCOLITH FLEXOLITH
CAR FLOORING
TUCO PRODUCTS CORP.
30 CHURCH STREET, NEW YORK
122 S. MICHIGAN AVE., CHICAGO

"V" Pilot and Pilot Fibrous Packings . . . . For Every LOCOMOTIVE AND SHOP Service
PILOT PACKING CO., INC.
CHICAGO NEW YORK SAN FRANCISCO

Western
DUMP CARS
Gives Complete Ballast Protection
WESTERN WHEELED SCRAPER CO.
Builders of Air Dump Cars
AURORA, ILLINOIS

Pittsburgh Spring & Steel Co.
1417 Farmers Bank Building, Pittsburgh, Pa.
Makers of Elliptic and Spiral SPRINGS of Every Description
of Carbon Vanadium and other alloy steels
Quality and Workmanship Guaranteed
Agencies
Washington, D. C. 824 Union Trust Bldg. — New York 2038 Grand Central Terminal — Chicago 1411 Fisher Bldg.

New Journal Box Lid requirements per A.R.A. circular No. A-337-1930 are complied with in ASCO A. R. A. Special Torsion Spring Journal Box Lids.
Allegheny
Allegheny Steel Company, Pittsburgh, Pa.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Track Appliances
Highway Crossing Signals
Signal Accessories
THE RAILROAD SUPPLY COMPANY
CHICAGO NEW YORK

WINE RAILWAY APPLIANCE CO.
TOLEDO, OHIO
Details of our products appear in following issues of Railway Age during 1931
January 3—February 7—March 7—April 4—May 2—June 6—July 4—August 1—or Railway Mechanical Engineer.

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Complete Railroad Shops and Locomotive Terminals
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Industrial Properties
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Robert W. Hunt Company
ENGINEERS
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All Railway Equipment, Structures and Materials
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CHICAGO
Offices in all principal cities

JOHN E. MUHLFELD
TRANSPORTATION ENGINEERING
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Gulick-Henderson Company
ENGINEERS
Inspection and Tests
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for Railways
General Office
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Pittsburgh Testing Laboratory
Pittsburgh, Penna.
Analysis . . Inspection . . Testing . . Research
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Second Hand Equipment — Get Together Department — Factory and Railroad Equipment

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IF you are open to overtures for new connection, and qualified for a salary between $2,500 and $25,000, your response to this announcement is invited. The undersigned provides a thoroughly organized service of recognized standing and reputation, through which preliminaries are negotiated confidentially for positions of the calibre indicated. The procedure is individualized to each client's personal requirements; your identity covered and present position protected. Established twenty-one years. Send only name and address for details. R. W. Bixby, Inc., 102 Downtown Building, Buffalo, New York.

RAILWAY and Tramway Control Gear designing Engineer required. Experience in design and operation of D. C. voltages up to 3,000 essential; A. C. an advantage. Write, stating age, experience and salary required, to Box 676, Selis Advertising Offices, Fleet Street, London, E. C. 4, England.

EXPORT Representation for Railroad Equipments, Engineering Supplies by highly trained Mechanical Engineer. Formerly Sales Manager, China, Japan, nine years. Executed millions of business. Exclusive experience European competition and Oriental trading. Direct connections with leading manufacturers preferred. No objections South America. Address Box 844, RAILWAY AGE, 30 Church St., New York City.

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OPPORTUNITY DESIRED with Railway Supply Company or Machine Tool Builder. Technical graduate with 12 years of practical railroading in mechanical department of large system, plus broad experience in railway supply marketing methods, desires position as sales engineer or as assistant to busy executive. Capable of conducting tests or handling all details including preparation of catalogs and all other publicity. Address Box 839, Railway Age, 30 Church Street, New York City.

EDUCATIONAL

SEND for Free Special Bulletin and learn how to increase your knowledge of practical railroad work and fit yourself for promotion. The Railway Educational Bureau, Omaha, Neb.

IRON & STEEL PRODUCTS, Inc.
Frank Parker, Pres.
Specializing in
FREIGHT & TANK CARS
RAILWAY EQUIPMENT
CAR PARTS
IRON & STEEL
80 East Jackson Chicago
Send us your inquiries

Take advantage of space in these columns.

Your classified advertisement should appear in this section.

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New and Relaying — Frogs — Tie Plates — Angle Bars—Cars of all types including Tank Cars, Hart Cars, Flat Cars, Box Cars—Railway Equipment—Used Car Parts—Steel Sheet Piling, both new and used.
HYMAN-MICHAELS COMPANY
New York, Los Angeles, Seattle, St. Louis — 20 No. Wacker Drive Bldg. CHICAGO — Paris, France — Pittsburgh, Houston, Portland, San Francisco

CONSTRUCTION EQUIPMENT
30—12-yd. Western Air or Hand Dump Cars
16—40 ft. Steel U. F. Rodgers Hart Ballast Cars
1—Jordan Steel Air Operated Spreader
11—Camp Cars
1—Blacksmith Car and Outfit
1—75 ton Baldwin 6-Wheel Switcher
1—2½ yd. Bucyrus R.R. Steam Shovel
Also Relaying Rails of all weights, and Steel Sheet Piling.
HYMAN-MICHAELS CO.
20 N. Wacker Dr. Bldg., Chicago, Ill.
Railway Exchange Bldg. St. Louis, Mo. — 101 West 31st St. New York

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Accounting Machines.
Remington Rand Business Service.

Acetylene, Dissolved.
Oxweld Railroad Service Co., The.

Aftercoolers, Air.
Ingersoll-Rand Co.
Worthington Pump & Machinery Corp.

Air Brakes.
New York Air Brake Co.
Westinghouse Air Brake Co.

Aircraft Corrugated Sheet.
Aluminum Co. of America.

Aircraft Extruded & Rolled Shapes.
Aluminum Co. of America.

Aircraft Plates.
Aluminum Co. of America.

Aircraft Screw Machine Products.
Aluminum Co. of America.

Aircraft Streamline & Round Tubing.
Aluminum Co. of America.

Air Lifts.
Ingersoll-Rand Co.
Worthington Pump & Machinery Corp.

Airport Drainage.
Republic Steel Corp.

Air Pumps.
New York Air Brake Co.
Union Asbestos & Rubber Co.
Westinghouse Air Brake Co.
Worthington Pump & Machinery Corp.

Air Reservoir Joints—(See Joints, Air Reservoir).

Alloy Steel.
Bethlehem Steel Co.
Illinois Steel Co.
Republic Steel Corp.
Ryerson & Son, Inc., Jos. T.

Alloys, Strong Aluminum.
Aluminum Co. of America.

Angle Bars — (See Joints, Rail).

Angles, Channels and Tees—(See Shapes, Structural).

Anti-Creepers, Rail.
Bethlehem Steel Co.
P. & M. Company, The.

Arch, Locomotive Brick.
American Arch Co., Inc.

Arresters, Lightning.
General Electric Co.
General Railway Signal Co.
P. & M. Company.
Railroad Supply Co., The.
Union Switch & Signal Co.
Westinghouse Elec. & Mfg. Co.

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Industrial Brownhoist Corp.

Ash Handling Machinery.
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Milwaukee Electric Crane & Hoist Corp.

Ash Pans, Cast Steel.
General Steel Castings Corp.

Auxiliary Locomotive.
Bethlehem Steel Co.

Axles, Car and Locomotive.
American Locomotive Co.
Baldwin Locomotive Works.
Bethlehem Steel Co.
Carnegie Steel Co.
Illinois Steel Co.
Lima Locomotive Works.
Midvale Co., The.
Standard Steel Works Co.

Axles, Mine Car.
Brill Co., The J. G.
Mt. Vernon Car Mfg. Co.

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Timken-Detroit Axle Co.

Babbitt Metal.
National Bearing Metals Corp.
Ryerson & Son, Inc., Jos. T.
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Baggage Door Controller Device.
Edwards Co., O. M.

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Century Wood Preserving Co.
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Central Alloy Steel Corp.
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Lockhart Iron & Steel Co.
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Batteries, Starting.
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S. K. F. Industries, Inc.
Westinghouse Elec. & Mfg. Co.

Bearings, Ball Thrust.
S. K. F. Industries, Inc.
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Bearings, Center.
Brill Co., The J. G.
Chicago Railway Equipment Co.
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Pressed Steel Car Co.
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National Bearing Metals Corp.
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Timken Roller Bearing Co., The.

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Fafnir Bearing Co.
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Chicago Railway Equipment Co.
Fort Pitt Malleable Iron Co.
Standard Car Truck Co.
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Wine Railway Appliance Co.

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General Steel Castings Corp.

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Prime Mfg. Co., The.

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Railroad Supply Co.

Belt Lacing Machines.
Birdsboro Steel Foundry & Mach. Co.

Benders, Rail.
Q & C Co., The

Bending and Straightening Machines.
Ryerson & Son, Jos. T.
Sellers & Co. Inc., Wm.

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Inland Steel Co.
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Midvale Co., The.
Ryerson & Son, Jos. T.
Republic Steel Corp.
Standard Steel Works Co.

Blocks, Chain.
Barco Mfg. Co.

Blocks, Creosoted.
American Creosoting Co.
Central Coal & Coke Co.
Century Wood Preserving Co.
(Division of the Wood Preserving Corp.)
International Creosoting & Constr. Co.
National Lumber & Creosoting Co.
Southern Wood Preserving Co.

Blooms, Steel.
Carnegie Steel Co.
Republic Steel Corp.

Blower Fittings, Automatic Smokebox.
Barco Mfg. Co.

Blowers, Turbo.
Ingersoll-Rand Co.

Blowtorches, Acetylene.
Oxweld Railroad Service Co., The.

Boiler (all types).
Baldwin Locomotive Works, The.

Boiler Checks.
Prime Manufacturing Co., The.

Boilers, Locomotive.
American Locomotive Co.
Baldwin Locomotive Works
Lima Locomotive Works.

Boilers, Scale Proof.
Industrial Brownhoist Corp.

Bolsters, Steel.
American Steel Foundries.
Bettendorf Co., The.
Birdsboro Steel Foundry & Mach. Co.
Bradford Corporation.
Brill Co., The J. G.
Buckeye Steel Castings Co.
Gould Coupler Co., The.
Mt. Vernon Car Mfg. Co.
Ohio Steel Foundry Co., The
Pressed Steel Car Co.
Symington & Son, Inc., T. H.

Bolts and Nuts.
Baldwin Locomotive Works, The
Bethlehem Steel Co.
Buffalo Brake Beam Co.
Dardelet Threadlock Corp.
Neely Nut & Bolt Co.
Russell, Burdsall & Ward Bolt and Nut Co.
Ryerson & Son, Joseph T.
Westinghouse Elec. & Mfg. Co.

Bolts & Nuts, Monel Metal.
International Nickel Co., The.

Bolts, Patch.
Falls Hollow Staybolt Co.
Ryerson & Son, Joseph T.

Bolts, Track.
Illinois Steel Co.
Inland Steel Co.
Ryerson & Son, Joseph T.

Bonders, Rail.
Q & C Co., The.

Bonding Rail Outfits.
Ingersoll-Rand Co.

Bonds, Rail.
American Steel & Wire Co.
Railroad Supply Co.
Westinghouse Elec. & Mfg. Co.

Bonds, Signal.
American Steel & Wire Co.
Railroad Supply Co.

Bond, Wire Protection.
P & M Co., The.

Boosters, Locomotives.
Franklin Railway Supply Co., Inc.

Boring & Drilling Machines, Horizontal.
Ryerson & Son, Joseph T.
Sellers & Co., Inc., Wm.

Boring Machines, Car Wheel
Sellers & Co., Inc., Wm.

Boring & Turning Mills, Horizontal.
Sellers & Co., Inc., Wm.

Boring & Turning Mills, Vertical.
Sellers & Co., Inc., Wm.

Bottom Rod Supports.
Buffalo Brake Beam Co.

Braces, Rail
Bettendorf Co., The.
Fort Pitt Malleable Iron Co.
National Malleable & Steel Castings Co.
Q & C Co., The.
Ramapo Ajax Co.
Symington Co., The.

Brake Beam Safety Guards.
Buffalo Brake Beam Co.
Chicago Railway Equipment Co.

Brake Beam Supports.
American Steel Foundries.
Brill Co., The J. G.
Buffalo Brake Beam Co.
Chicago Railway Equipment Co.

Brake Beams.
American Steel Foundries.
Bradford Corporation.
Buffalo Brake Beam Co.
Chicago Railway Equipment Co.
Hunt-Spiller Mfg. Corp.
Mt. Vernon Car Mfg. Co.
National Malleable & Steel Castings Co.
Pressed Steel Car. Co.

Brake Drums.
American Car & Foundry Motors Co.
Hunt-Spiller Mfg. Corp.

Brake Forgings, Pins, Levers, etc.
American Steel Foundries.
Brill Co., The J. G.
Buffalo Brake Beam Co.
Davis Brake Beam Co.
Mt. Vernon Car Mfg. Co.
Schaefer Equipment Co.

Brakes, Hand.
National Brake Co.

Brake Heads.
American Steel Foundries.
Brill Co., The J. G.
Buffalo Brake Beam Co.
Chicago Railway Equipment Co.
Pressed Steel Car Co.

Brake Jaws.
Mt. Vernon Car Mfg. Co.
National Malleable & Steel Castings Co.
Schaefer Equipment Co.

Brake Shoes.
American Brake Shoe & Foundry Co.
American Steel Foundries.
Brill Co., The J. G.
Buckeye Steel Castings Co.
Fort Pitt Malleable Iron Co.

Brakes, Air.
General Electric Co.
New York Air Brake Co.
Westinghouse Air Brake Co.

Brakes, Clasp.
American Steel Foundries.

Brakes, Electric.
New York Air Brake Co.
Westinghouse Air Brake Co.

Brakes, Hand.
Miner, W. H.
National Brake Co.
National Malleable & Steel Castings Co.
Wine Railway Appliance Co.

Brass, Sash.
Edwards Co., O. M.

Brick, Locomotive Arch.
American Arch Co., Inc.

Bridge Builders.
American Bridge Co.
Bethlehem Steel Co.

Bridge & Crossing Planks, Treated.
Century Wood Preserving Co.
(Division of the Wood Preserving Corp.)
Curtin-Howe Corp.
International Creosoting & Construction Co.
National Lumber & Creosoting Co.

Bridge Flooring.
Carey Co., The, Philip.

Bridge Material, Treated.
Century Wood Preserving Co.
(Division of the Wood Preserving Corp.)
Curtin-Howe Corp.
International Creosoting & Construction Co.
National Lumber & Creosoting Co.

Bridge Stringers — (See Stringers, Bridge).

Bronze Powder, Aluminum.
Aluminum Co. of America.

Bucket Handling.
Industrial Brownhoist Corp.
Milwaukee Electric Crane & Hoist Corp.

Buckets, Grab.
American Bridge Co.
American Hoist & Derrick Co.
Industrial Brownhoist Corp.
Milwaukee Electric Crane & Hoist Corp.
Orton Crane & Shovel Co.

Buffers, Friction.
Edgewater Steel Co.
Miner, W. H.
Standard Coupler Co.
Westinghouse Air Brake Co.

Buffers, Radial.
Franklin Railway Supply Co., Inc.

Building Materials.
Carey & Co., Philip, The.
Johns-Manville Corp.

Buildings, Iron, Steel and Steel Concrete.
American Bridge Co.
United Engineers & Constructors, Inc.

Bulldozers.
Ryerson & Son, Joseph T.

Buses, Motor.
Reo Motor Car Co.

Bushings, Driving & Engine Truck Boxes.
Locomotive Finished Material Co.

Cable Accessories, Electrical.
Graybar Electric Co.

Cables, Electric.
American Steel & Wire Co.
Anaconda Wire & Cable Co.
General Electric Co.
Graybar Electric Co.
Kerite Insulated Wire & Cable Co.

Cableways—(See Tramways).

Caps, Grease.
Prime Mfg. Co., The.

Carbide, Calcium.
Oxweld Railroad Service Co.

Car Insulation.
Carey & Co., Philip, The.
Wood Conversion Co.

Car Lighting Equipment—(See Lighting, Car Equipment).

Carlines.
Hutchins Car Rfg. Co.
Mt. Vernon Car Mfg. Co.
Pressed Steel Car Co.

Car Material, Wood.
Central Coal & Coke Co.

Car Parts and Appliances.
Pressed Steel Car Co.
Pullman Car & Mfg. Corp.

Car Parts, Freight.
Bettendorf Co., The.
General American Tank Car Corporation.
Pressed Steel Car Co.

Car Parts, Passenger.
Brill Co., The J. G.
St. Louis Car Co.

Car Repairs.
General American Tank Car Corporation.
Pressed Steel Car Co.
St. Louis Car Co.
Tennessee Coal, Iron & Railroad Co.

Car Retarder Systems.
General Railway Signal Co.
Union Switch & Signal Co.

Car Siding — (See Siding, Car, etc.).

Cars, Baggage.
Brill Co., The J. G.
Pressed Steel Car Co.
St. Louis Car Co.

Cars, Ballast.
Bethlehem Steel Co.
General American Tank Car Co.
Mt. Vernon Car Mfg. Co.
Pressed Steel Car Co.
Western Wheeled Scraper Co.

Cars, Caboose, Coal & Stock.
Mt. Vernon Car Mfg. Co.

Cars, Convertible.
Mt. Vernon Car Mfg. Co.

Cars, Dump.
Bethlehem Steel Co.
Bettendorf Co., The.
Mt. Vernon Car Mfg. Co.
Pressed Steel Car Co.
Western Wheeled Scraper Co.

Cars, Flat, Narrow Gauge.
Bettendorf Co., The.
Pressed Steel Car Co.
Western Wheeled Scraper Co.

Cars, Freight.
Bethlehem Steel Co.
Bettendorf Co., The.
General American Tank Car Corp.
Mt. Vernon Car Mfg. Co.
Pressed Steel Car Co.
Pullman Car & Mfg. Co.

Cars, Freight (New and Repaired).
Bethlehem Steel Co.
Bettendorf Co., The.
General American Tank Car Corp.
Pressed Steel Car Co.

Cars, Gasoline-Electric.
Brill Co., The J. G.
Electro-Motive Co.
St. Louis Car Co.

Cars, Gasoline Motor.
Brill Co., The J. G.

Cars, Hand & Push.
Fairbanks-Morse & Co.

Cars, Industrial.
Bethlehem Steel Co.
Brill Co., The J. G.
General American Tank Car Corp.
Pressed Steel Car Co.
Western Wheeled Scraper Co.

Cars, Motor.
Fairbanks-Morse & Co.

Cars, Motor Inspection.
Fairbanks-Morse & Co.

Cars, Oil Electric.
Westinghouse Elec. & Mfg. Co.

Cars, Ore.
Brill Co., The J. G.
General American Tank Car Corp.
Pressed Steel Car Co.

Cars, Passenger.
Bethlehem Steel Co.
Brill Co., The J. G.
Electro-Motive Co.
Pressed Steel Car Co.
Pullman Car & Mfg. Corp.

Cars, Power Units.
Brill Co., The J. G.
Electro-Motive Co.

Cars, Quarry.
Pressed Steel Car Co.
Western Wheeled Scraper Co.

Cars, Rebuilt and Repaired.
Bettendorf Co., The.
General American Tank Car Corp.
Mt. Vernon Car Mfg. Co.
Pressed Steel Car Co.
Western Wheeled Scraper Co.

Cars, Refrigerator.
General American Tank Car Co.
Mt. Vernon Car Mfg. Co.
Pressed Steel Car Co.

Cars, Second-Hand.
Pressed Steel Car Co.
Western Wheeled Scraper Co.

Cars, Self-Propelled Passenger.
Brill Co., The J. G.
Electro-Motive Co.
General Electric Co.
Pullman Car & Mfg. Corp.
Westinghouse Elec. & Mfg. Co.

Cars, Spreader.
Western Wheeled Scraper Co.

Cars, Tank.
Bethlehem Steel Co.
General American Tank Car Corp.
Indian Refining Co.
Pressed Steel Car Co.

Cars, Dump.
Western Wheeled Scraper Co.

Castings, Alloy Steel.
Symington Co., The.
Union Spring & Mfg. Co.

Castings, Brass and Bronze.
Baldwin Locomotive Works, The.
General Railway Signal Co.
Magnus Co., Inc.
National Bearing Metals Corp.
Union Switch & Signal Co.

Castings, Gray Iron.
American Brake Shoe & Foundry Co.
American Locomotive Co.
Baldwin Locomotive Works.
General Railway Signal Co.
Mt. Vernon Car Mfg. Co.
Ramapo Ajax Corp.
Union Switch & Signal Co.

Castings, Gun Iron.
Hunt-Spiller Mfg. Corp.

Castings, Iron & Steel.
Baldwin Locomotive Works, The.
Industrial Brownhoist Corp.

Castings, Malleable Iron.
Buckeye Steel Castings Co.
Buffalo Brake Beam Co.
Chicago Railway Equipment Co.
Fort Pitt Malleable Iron Co.
National Malleable & Steel Castings Co.
P & M Company, The.
Pressed Steel Car Co.
Symington Co., The.
Universal Draft Gear Attachment Co.

Castings, Monel Metal.
International Nickel Co., The.

Castings, Steel.
Allegheny Steel Co.
American Locomotive Co.
American Steel Foundries.
Bethlehem Steel Co.
Bettendorf Co., The.
Birdsboro Steel Foundry & Mach. Co.
Buckeye Steel Castings Co.
General Steel Castings Corp.
Gould Coupler Co., The.
McConway & Torley Co.
Midvale Co., The.
National Malleable & Steel Castings Co.
Pressed Steel Car Co.
Standard Steel Works Co.
Union Spring & Mfg. Co.
Union Steel Casting Co.
Universal Draft Gear Attachment Co.

Castings, Steel Loco.
Birdsboro Steel Foundry & Machine Co.
General Steel Castings Corp.
Gould Coupler Co., The.
Ohio Steel Foundry Co., The.
Standard Steel Works Co.
Union Steel Casting Co.

Castings, Steel Vanadium.
Birdsboro Steel Foundry & Machine Co.
Brill Co., The J. G.
Ohio Steel Foundry Co., The.
Standard Steel Works Co.
Union Steel Casting Co.

Catchbasins, Iron.
Armco Culvert Mfrs. Assoc.

Cellers, Engine Truck.
Ardco Mfg. Co.

Cement Car, Asphalt.
Lehon Co., The.
Sherwin-Williams Co.

Cement, High Temperature.
Carey Co., Philip, The.
Johns-Manville Corp.

Cements, Asbestos and Magnesia.
Carey Co., Philip, The.

Center Plates—(See Bearings, Center).

Center Sills.
Bettendorf Co., The.
Bradford Corporation.

Chain, Monel Metal.
International Nickel Co., The.

Chemicals.
Bird-Archer Co., The.
Dearborn Chemical Co.
Hunt Co., Robert W.

Chemicals, Boiler.
Bird-Archer Co., The.
Dearborn Chemical Co.

Chemicals, Cleaning.
Oakite Products, Inc.

Chemists.
Bird-Archer Co., The.
Dearborn Chemical Co.
Hunt Co., Robert W.
Pittsburgh Testing Laboratory.

Chromium Plating.
Worthington Pump & Machinery Corp.

Chucks, Lathe.
Ryerson & Son, Jos. T.

Cinder Handling Plants.
Roberts & Schaefer Co.

Circuit Breakers.
General Electric Co.
Union Switch & Signal Co.
Westinghouse Elec. & Mfg. Co.

Clamps, Forging.
Ryerson & Son, Jos. T.

Clamps, Guard Rail.
O. & C. Co., The.
Westinghouse Air Brake Co.

Clamps, Hose.
Ingersoll-Rand Co.
National Malleable & Steel Castings Co.
Vapor Car Heating & Lighting Co.
Westinghouse Air Brake Co.

Clamps, Pipe.
Franklin Railway Supply Co., Inc.
National Malleable & Steel Castings Co.

Clamps, Rail Cutting.
Oxweld Railroad Service Co., The.

Classification Yard Systems.
General Railway Signal Co.
Union Switch & Signal Co.

Cleaners, Aircraft.
Oakite Products, Inc.

Cleaners, Air Pump.
Oakite Products, Inc.
Westinghouse Air Brake Co.

Cleaners, Bus & Truck.
Oakite Products, Inc.

Cleaners, Car.
Oakite Products, Inc.

Cleaners, Flue.
Ryerson & Son, Jos. T.

Cleaners, General.
Oakite Products, Inc.

Cleaners, Locomotive.
Oakite Products, Inc.

Cleaners, Metal.
Oakite Products, Inc.

Clips, Wire Rope.
American Steel & Wire Co.

Coach and Coach Yard Steam Joints—(See Joints, etc.)

Coaches, Motor.
American Car & Foundry Motors Co.
Dodge Motor Truck Corp.
International Harvester Co.
White Co., The.

Coaches, SecondHand.
Hyman-Michaels Co.

Coal, Ore & Ash Handling Machinery.
Industrial Brownhoist Corp.
Milwaukee Electric Crane & Hoist Corp.
Orton Crane & Shovel Co.
Roberts & Schaefer Co.

Coal Pushers.
Standard Stoker Co.

Coaling Stations.
American Bridge Co.
FairbanksMorse & Co.
Roberts & Schaefer Co.

Cocks, Angle.
Westinghouse Air Brake Co.

Cocks, Blow-Off.
Bird-Archer Co., The.

Cocks, Cylinder.
Prime Manufacturing Co., The.

Columns, Water.
Prime Manufacturing Co., The.

Combination Crane Pile Drivers.
Industrial Brownhoist Corp.

Compounds, Boiler.
Dearborn Chemical Co.
Bird-Archer Co., The.

Compounds, Cleaning.
Oakite Products, Inc.

Compounds, Cutting.
Oakite Products, Inc.

Compounds, Grinding.
Oakite Products, Inc.

Compounds, Paint Removing.
Oakite Products, Inc.

Compounds, Rust Proofing.
Oakite Products, Inc.

Compressors, Air.
Ingersoll-Rand Co.
New York Air Brake Co.
Westinghouse Air Brake Co.
Worthington Pump & Machinery Corp.

Concrete Floor Slabs.
Federal American Cement Tile Co.

Concrete Reinforcement.
American Steel & Wire Co.
Carnegie Steel Co.
Ryerson & Son, Jos. T.

Concrete Roofing, Tile.
Federal American Cement Tile Co.

Condensers.
Ingersoll-Rand Co.

Condensing Apparatus.
Ingersoll-Rand Co.
Worthington Pump & Machinery Corp.

Conduit, Rigid.
Aluminum Co. of America.

Conduits, Metallic Flexible.
Barco Mfg. Co.
Franklin Railway Supply Co., Inc.
Graybar Electric Co.
Vapor Car Heating Co., Inc.

Conduit, Underground.
Graybar Electric Co.
Johns-Manville Corp.

Connections, Lever.
National Malleable & Steel Castings Co.

Connections, Truck.
National Malleable & Steel Castings Co.

Connections, Truck Lever.
Schaefer Equipment Co.

Contraction Joint.
General Railway Signal Co.

Control Devices, Train Speed.
Union Switch & Signal Co.

Control, Locomotive.
Valve Pilot Co.

Controllers, Electric.
General Electric Co.
Westinghouse Electric & Mfg. Co.

Conveying Machinery.
American Bridge Co.
Industrial Brownhoist Corp.
Milwaukee Electric Crane & Hoist Corp.
Orton Crane & Shovel Co.

Corrugated Sheet.
Aluminum Co. of America.

Conveyor, Ash—(See Coal, Ore and Ash Handling Mach.).

Coupler Pockets—(See Draft Yokes).

Coupler Yokes.
Bettendorf Co., The.
Gould Coupler Co.
Symington Co., The.

Couplers.
American Steel Foundries.
Buckeye Steel Castings Co.
Franklin Railway Supply Co., Inc.
Gould Coupler Co., The.
McConway & Torley Co.
National Malleable & Steel Castings Co.
Standard Coupler Co.
Westinghouse Air Brake Co.

Couplings, Hose.
Fort Pitt Malleable Iron Co.
Gold Car Heating & Lighting Co.
Ingersoll-Rand Co.
Vapor Car Heating Co., Inc.
Westinghouse Air Brake Co.

Cranes, Ballast Cleaning.
American Hoist & Derrick Co.
Industrial Brownhoist Corp.
Ohio Locomotive Crane Co.

Cranes, Barge.
Industrial Brownhoist Corp.
Ohio Locomotive Crane Co.

Cranes, Bracket.
Shephard-Niles Crane & Hoist Corp.

Cranes, Crawler.
American Hoist & Derrick Co.
Industrial Brownhoist Corp.
Orton Crane & Shovel Co.

Cranes, Crawling Shovels and Draglines.
Industrial Brownhoist Corp.
Orton Crane & Shovel Co.

Cranes, Diesel.
Industrial Brownhoist Corp.
Ohio Locomotive Crane Co.

Cranes, Electric Traveling.
Industrial Brownhoist Corp.
Milwaukee Electric Crane & Hoist Corp.

Cranes, Gantry.
Industrial Brownhoist Corp.
Milwaukee Electric Crane & Hoist Corp.
Ohio Locomotive Crane Co.
Orton Crane & Shovel Co.
Shephard-Niles Crane & Hoist Corp.

Cranes, Gasoline.
Industrial Brownhoist Corp.
Ohio Locomotive Crane Co.

Cranes, Grab Bucket.
Milwaukee Electric Crane & Hoist Corp.

Cranes, Handpower.
Industrial Brownhoist Corp.
Shephard-Niles Crane & Hoist Corp.

Cranes, Jib.
Industrial Brownhoist Corp.
Milwaukee Electric Crane & Hoist Corp.
Worthington Pump & Machinery Corp.

Cranes, Locomotive.
Industrial Brownhoist Corp.
Ohio Locomotive Crane Co.
Orton Crane & Shovel Co.

Cranes, Overhead.
Industrial Brownhoist Corp.
Milwaukee Electric Crane & Hoist Corp.
Shephard-Niles Crane & Hoist Corp.

Cranes, Pillar.
Industrial Brownhoist Corp.
Milwaukee Electric Crane & Hoist Corp.

Cranes, Portable.
Orton Crane & Shovel Co.

Cranes, Transfer.
Industrial Brownhoist Corp.
Milwaukee Electric Crane & Hoist Corp.

Cranes, Traveling.
Milwaukee Electric Crane & Hoist Corp.
Shephard-Niles Crane & Hoist Corp.

Cranes, Wharf.
Industrial Brownhoist Corp
Ohio Locomotive Crane Co.

Cranes, Wrecking.
Industrial Brownhoist Corp.
Orton Crane & Shovel Co.

Crank Pins — (See Pins, Crank).

Creosote.
American Creosoting Co.
Century Wood Preserving Co. (Division of the Wood Preserving Corp.)
International Creosoting & Constr. Co.
National Lumber & Creosoting Co.

Creosote, Wood Preservative Treatment.
Century Wood Preserving Co. (Division of the Wood Preserving Corp.)
National Lumber & Creosoting Co.

Cribbing Units.
Federal American Cement Tile Co.

Cross Arms, Treated.
American Creosoting Co.
Century Wood Preserving Co. (Division of the Wood Preserving Corp.)
Curtin-Howe Corp.
Graybar Electric Co.
International Creosoting & Construction Co.
National Lumber & Creosoting Co.
Southern Wood Preserving Co.

Cross Ties, Treated.
American Creosoting Co.
Century Wood Preserving Co. (Division of the Wood Preserving Corp.)
Curtin-Howe Corp.
International Creosoting & Construction Co.
National Lumber & Creosoting Co.
Southern Wood Preserving Co.

Cross Ties, Steel.
Bethlehem Steel Co.

Crossheads & Shoes.
Baldwin Locomotive Wks.
Barco Mfg. Co.
International Creosoting & Construction Co.

Crossing Signals & Signs.
Railroad Supply Co.

Crossings—(See Frogs and Crossings).

Crossings, Pavement.
Carey Co., The Philip.

Crushers, Coal.
American Sheet & Tin Plate Co.
Orton Crane & Shovel Co.

Culverts.
Armco Culvert Mfrs. Assoc.
Republic Steel Corp.
Toncan Culvert Manufacturers' Association.

Culverts, Corrugated Iron
Armco Culvert Manufacturers' Association.
Republic Steel Corp.

Culverts, Part Circle
Armco Culvert Manufacturers Association

Culverts, Treated.
Century Wood Preserving Co. (Division of the Wood Preserving Corp.)
National Lumber & Creosoting Co.
Southern Wood Preserving Co.

Cups, Oil.
New York Air Brake Co.
Prime Manufacturing Co., The.
Westinghouse Air Brake Co.

Curtain Material, Car.
Ryerson & Son, Jos. T.

Curtains, Cab.
Lehon Co., The.

Cutting and Welding Apparatus.
Electric Railweld Service Corp.
Oxweld Railroad Service Co.
Westinghouse Electric & Mfg. Co.

Cut-Off Indicators and Recorders.

Cylinder Parts, Finished and Rough.
National Tube Co.
Valve Pilot Co.

Cylinders, Air Brake.
Westinghouse Air Brake Co.

Cylinders, Cast Steel Locomotive.
General Steel Castings Corp.

Cylinders, Locomotive
Union Steel Casting Co.

Deoxidizers.
Q & C Co., The.
Vanadium Corp. of America.

Derricks.
Industrial Brownhoist Corp.

Diesel Electric Power Plants.
Fairbanks-Morse & Co.
Westinghouse Elec. & Mfg. Co.

Dirt Collectors.
New York Air Brake Co.
Westinghouse Air Brake Co.

Disinfectants.
West Disinfecting Co.

Dispatching Systems.
General Railway Signal Co.
Union Switch & Signal Co.

Ditching Machinery.
Industrial Brownhoist Corp.
Orton Crane & Shovel Co.

Door Fixtures — (See Fixtures, Car Door).

Doors, Car.
Camel Sales Co.
Chicago Railway Equipment Co.
Miner, W. H.
Wine Railway Appliance Co.

Doors, Locomotive Firebox.
Franklin Railway Supply Co., Inc.

Doors, Rolling, Steel.
Kinnear Mfg. Co.

Draft Arms.
American Steel Foundries.
Birdsboro Steel Foundry & Machine Co.
Bradford Corporation.
Symington Co., The.
Universal Draft Gear Attachment Co.

Draft Gear Attachments.
Symington Co., The

Draft Gears.
American Steel Foundries.
Bradford Corporation.
Cardwell-Westinghouse Co.
Edgewater Steel Co.
Fort Pitt Malleable Iron Co.
Miner, W. H.
National Malleable & Steel Castings Co.
Standard Coupler Co.
Union Draft Gear Co.
Universal Draft Gear Attachment Co.

Draft Yokes.
American Steel Foundries.
Bettendorf Co., The.
Buckeye Steel Castings Co.
Gould Coupler Co., The.
McConway & Torley Co.
Miner, W. H.
Mt. Vernon Car Mfg. Co.
National Malleable & Steel Castings Co.
Pressed Steel Car Co.
Steel Car Forge Co.
Symington Co. The.
Universal Draft Gear Attachment Co.

Drainage Gates, Automatic
Armco Culvert Mfrs. Assoc.
Republic Steel Corp.

Drains, Perforated Iron.
Republic Steel Corp.

Drawbar Centering Device.
Gould Coupler Co., The.
Miner, W. H.

Drawbars, Unit Safety.
Franklin Railway Supply Co., Inc.
Industrial Brownhoist Corp.

Dredging Machinery.
Industrial Brownhoist Corp.

Drilling Machines.
Sellers & Co., Inc., Wm.

Drilling Machines, Bonding.
Railroad Supply Co.

Drilling Machines, Pneumatic
Ingersoll-Rand Co.

Drilling Machines, Rock.
General Electric Co.
Ingersoll-Rand Co.
Worthington Pump & Machinery Corp.

Drilling Machines, Upright and Radial.
Ryerson & Son, Joseph T.
Sellers & Co., Inc., Wm.

Drills.
Ingersoll-Rand Co.

Drills, Close Corner.
Ingersoll-Rand Co.

Drills, Concrete.
Ingersoll-Rand Co.
Worthington Pump & Machinery Corp.

Drills, Steel Rock and Steel Sharpened.
Ingersoll-Rand Co.
Worthington Pump & Machinery Corp.

Drills, Track & Bending.
Bird-Archer Co., The.
Ingersoll-Rand Co.

Drive Gas Electric Coaches.
General Electric Co.

Drive Gas Electric Locomotives
Westinghouse Electric & Mfg. Co.

Driving Boxes (Extended Main).
Franklin Railway Supply Co., Inc.

Drop Door Mechanism.
Wine Railway Appliance Co.

Dynamos—(See Generators, Electric).

Electrical Cable Accessories.
General Electric Supply Corp.

Electric Cables.
American Steel & Wire Co.
Anaconda Wire & Cable Co.
General Electric Supply Corp.

Electrical Instruments.
Electric Service Supplies Co.
Railroad Supply Co.
Westinghouse Elec. & Mfg. Co.

Electrical Supplies.
General Electric Co.
General Electric Supply Corp.
Graybar Electric Co.
Westinghouse Elec. & Mfg. Co.

Electrification, Railroad.
Battey & Kipp.
General Electric Co.
United Engineers & Constructors, Inc.
Westinghouse Elec. & Mfg. Co.

Electric Heaters.
General Electric Supply Corp.

Electrical Insulation.
General Cable Corp.
General Electric Supply Corp.

Electrical Porcelain Insulators.
General Electric Supply Corp.

Electric Motors.
General Electric Supply Corp.

Electric Rivet Heaters.
General Electric Supply Corp.

Electric Switches.
General Electric Supply Corp.

Enamels.
Lowe Bros. Co., The.
Sherwin-Williams Co.

End Frames, Cast Steel, Passenger Car.
General Steel Castings Corp.

Ends, Steel.
Hutchins Car Rfg. Co.
Union Metal Products Co.

Engineers, Consulting, Civil, Elec., Hydraulic, Mechanical.
Battey & Kipp.
Hunt Co., Robt. W.
Muhlfeld, John E.
United Engineers & Constructors, Inc.

Engineers, Contracting.
Battey & Kipp.
United Engineers & Constructors, Inc.

Engineers and Contractors.
Battey & Kipp.
Hunt Co., Robert W.
Muhlfeld, John E.
United Engineers & Constructors, Inc.

Engineers, Construction.
Battey & Kipp.
Roberts & Schaefer Co.
United Engineers & Constructors, Inc.

Engineers and Contractors, Elec., Hydraulic, Mech.
Battey & Kipp.
Hunt Co., Robert W.
Muhlfeld, John E.
Roberts & Schaefer Co.

Engineers, Inspecting.
Gulick-Henderson Co.
Hunt Co., Robert W.
Muhlfeld, John E.
Pittsburgh Testing Laboratory.
United Engineers & Constructors, Inc.

Engineers, Valuation.
Hunt Co., Robert W.
United Engineers & Constructors, Inc.

Engines, Crude & Fuel Oil.
Fairbanks-Morse & Co.
Ingersoll-Rand Co.
Worthington Pump & Machinery Corp.

Engines, Diesel.
Worthington Pump & Machinery Corp.

Engines, Gas.
Brill Co., The J. G.
Worthington Pump & Machinery Corp.

Engines, Gas & Gasoline.
American Car & Foundry Motors Co.
Fairbanks-Morse & Co.
Ingersoll-Rand Co.
Worthington Pump & Machinery Corp.

Engines, Hoisting.
Industrial Brownhoist Corp.
Orton Crane & Shovel Co.

Excavators.
Industrial Brownhoist Corp.

Exhaust & Heater Pipe.
Union Asbestos & Rubber Co.

Exhaust & Ventilating Fans.
General Electric Supply Corp.

Expanders, Tube.
Ryerson & Son, Joseph T.

Fans, Exhaust & Ventilating.
General Electric Co.
Graybar Electric Co.
Westinghouse Elec. & Mfg. Co.

Fasteners, Car Door.
Camel Sales Co.
Fort Pitt Malleable Iron Co.
Miner, W. H.
National Malleable & Steel Castings Co.

Feed Water Heater Systems.
Bird-Archer Co., The.
Worthington Pump & Machinery Corp.

Fencing Wire—(See Wire, Fence).

Fence Posts, Treated.
American Steel & Wire Co.
Century Wood Preserving Co. (Division of the Wood Preserving Corp.)
Curtin-Howe Corp.
International Creosoting & Construction Co.
National Lumber & Creosoting Co.

Ferro Alloys.
Vanadium Corp. of America.

Ferro, Chromium.
Vanadium Corp. of America.

Ferro, Molybdenum.
Vanadium Corp. of America.

Ferro, Silicon.
Vanadium Corp. of America.

Ferro, Tungsten.
Vanadium Corp. of America.

Ferro, Vanadium.
Vanadium Corp. of America.

Filters, Air.
New York Air Brake Co.
Westinghouse Air Brake Co.

Filters, Water & Industrial.
Graver Tank & Mfg. Corp.

Filtration Plants (Water).
Graver Tank & Mfg. Corp.

Fireboxes.
American Locomotive Co.
Baldwin Locomotive Works.

Fire Fighting & Protection Equipment.
Johns-Manville Corp.

Fittings, Air Brakes.
Westinghouse Air Brake Co.

Fittings, Steam.
Vapor Car Heating Co., Inc.

Fixtures, Car Door.
Camel Sales Co.
Chicago Railway Equipment Co.
Miner, W. H.
National Malleable & Steel Castings Co.

Flangers, Snow.
Q & C Co., The.

Floodlights.
General Electric Supply Corp.
Graybar Electric Co.
Oxweld Railroad Service Co.
Pyle-National Co.
Symington Co., The.
Westinghouse Elec. & Mfg. Co.

Floodlights, Acetylene.
Oxweld Railroad Service Co., The.

Flooring.
Carey & Co., Philip, The.
Johns-Manville Corp.

Flooring, Car.
Tuco Products Corp.

Flooring, Coach.
Tuco Products Corp.

Flooring, Composition.
Johns-Manville Corp.
Tuco Products Corp.

Flooring, Treated.
Central Coal & Coke Co.
Century Wood Preserving Co. (Division of the Wood Preserving Corp.)
Curtin-Howe Corp.
National Lumber & Creosoting Co.

Floor Plates, Steel.
Carnegie Steel Co.
Illinois Steel Co.
Inland Steel Company

Floor Slabs, Concrete.
American Cement Tile Mfg. Co.

Flue Cleaners—(See Cleaners, Flue).

Flue Cutters—(See Cutters, Flue).

Flues, Boiler—(See Tubes, Boiler).

Flue Shop Equipment.
Ryerson & Son, Joseph T.

Forges, Rivet Heating.
Ryerson & Son, Joseph T.

Forging Hammers.
Industrial Brownhoist Corp.

Forgings.
American Bridge Co.
American Steel Foundries.
Baldwin Locomotive Works, The.
Bethlehem Steel Co.

Brill Co., The J. G.
Carnegie Steel Co.
Edgewater Steel Co.
General Railway Signal Co.
Gould Coupler Co., The.
Illinois Steel Co.
Midvale Co., The.
Mt. Vernon Car Mfg. Co.
Neely Nut & Bolt Co.
Pressed Steel Car Co.
Standard Steel Works Co.
Steel Car Forge Co.
Universal Draft Gear Attachment Co.

Forgings, Drop.
Baldwin Locomotive Works, The.
Brill Co., The J. G.
General Railway Signal Co.
Steel Car Forge Co.
Union Switch & Signal Co.

Forgings, Monel Metal.
International Nickel Co., The.

Foundry Supplies.
Bird-Archer Co., The.

Frames, Cast Steel Locomotive
General Steel Castings Corp.

Frames, Locomotive.
American Steel Foundries.
American Locomotive Co.
Baldwin Locomotive Works.
Birdsboro Steel Foundry & Machine Co.
Ohio Steel Foundry Co., The.
Union Steel Casting Co.

Frames, Truck.
American Locomotive Co.
American Steel Foundries.
Baldwin Locomotive Works
Bettendorf Co., The.
Birdsboro Steel Foundry & Machine Co.
Buckeye Steel Castings Co.
Brill Co., The J. G.
Franklin Railway Supply Co., Inc.
Gould Coupler Co., The.
Ohio Steel Foundry Co., The.
Pressed Steel Car Co.
Pyle-National Co.
Symington Co., The.

Frames, Vanadium.
American Locomotive Co.
Baldwin Locomotive Works
Birdsboro Steel Foundry & Machine Co.
Union Steel Casting Co.

Frogs and Crossings.
Bethlehem Steel Co.
Ramapo Ajax Corp.

Fulcrums, Brake Beam.
American Steel Foundries.
Brill Co., The J. G.
Buffalo Brake Beam Co.
Chicago Railway Equipment Co.
National Malleable & Steel Castings Co.

Furnaces, Electric.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Furnaces, Gasoline.
Railroad Supply Co.

Furnaces, Rivet Heating—(See Forges, Rivet Heating).

Furniture.
Aluminum Co. of America

Gage Testers—(See Testers, Gage).

Gages, Air.
Westinghouse Air Brake Co.

Gages, Oxy-Acetylene.
Oxweld Railroad Service Co., The.

Gages, Steam.
Ashton Valve Co.

Gages, Tire.
Schrader's Son, Inc., A.

Gages, Wheel Press Recording.
Ashton Valve Co.

Gaskets.
Westinghouse Air Brake Co.

Gasoline.
Ethyl Gasoline Corp.

Gear Blanks, Rolled Steel.
Edgewater Steel Co.
Standard Steel Works Co.

Gears and Pinions.
American Steel Foundries.
Westinghouse Elec. & Mfg. Co.

Gears, Silent.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Gears, Valve — (See Valve Gears).

Generators, Acetylene.
Oxweld Railroad Service Co.

Generators, Electric.
Fairbanks-Morse & Co.
General Electric Co.
Graybar Electric Co.
Sunbeam Electric Mfg. Co
Westinghouse Elec. & Mfg. Co.

Goggles, Welding.
Oxweld Railroad Service Co., The.
Sunbeam Electric Mfg. Co.

Graders, Elevating.
Western Wheeled Scraper Co.

Grapples, Wood.
Industrial Brownhoist Corp.

Grate Bars.
Q & C Co., The.

Grate Shakers, Automatic.
Franklin Railway Supply Co., Inc.

Grates.
Firebar Corp.

Grease Forming Machines.
Franklin Railway Supply Co., Inc.

Grey Iron.
American Brake Shoe & Foundry Co.

Grinders, Internal.
Micro Machine Co.

Grinders, Portable Crank Pin.
Micro Machine Co.

Grinding Machines.
Sellers & Co., Inc., Wm.

Grinding Machines, Portable.
Ingersoll-Rand Co.
Ryerson & Son, Inc., Joseph T.

Guard Rails, Treated.
Curtin-Howe Corp.
International Creosoting & Construction Co.

Guard Rails, Foot Guard.
Q & C Co., The.

Guard Rails (One Piece).
Bethlehem Steel Co.
Ramapo Ajax Corp.

Guard Switch Point.
Q & C Co., The.

Guards, Cattle.
American Bridge Co.

Guards, Dust.
Gould Coupler Co., The.
Symington Co., The.

Hair Felt.
Johns-Manville Corp.

Hammers, Pneumatic.
Ingersoll-Rand Co.

Hammers, Riveting.
Ingersoll-Rand Co.

Hammers, Steam.
Industrial Brownhoist Corp.
Sellers & Co., Inc., Wm.

Hand Brakes—(See Brakes, Hand).

Hangers, Ball Bearing.
S. K. F. Industries, Inc.

Hand Rails & Fittings.
Aluminum Co. of America.

Hangers, Bottom Rod Safety.
Chicago Railway Equipment Co.

Hangers, Car Door—(See Fixtures, Car Door).

Headgates, Sliding
Armco Culvert Manufacturers Association

Headlight Repair Parts, Electric.
Electric Service Supplies Co.
Pyle-National Co.
Sunbeam Electric Mfg. Co.

Headlights, Electric.
General Electric Co.
Pyle-National Co., The.
Sunbeam Electric Mfg. Co.
Westinghouse Electric & Mfg. Co.

Headlights, Reflectors & Cases.
Pyle-National Co.
Sunbeam Electric Mfg. Co.

Heaters, Electric.
Gold Car Heating & Lighting Co.
Westinghouse Electric & Mfg. Co.

Heaters, Feedwater.
Graver Tank & Mfg. Corp.

Heaters, Feedwater Locomotive.
Coffin Co., Jr., The J. S.
Superheater Company, The.
Worthington Pump & Machinery Corp.

Heaters, Feed Water, Stationary.
Brill Co., The J. G.
Worthington Pump & Machinery Corp.

Heating & Ventilating Apparatus.
Gold Car Heating & Lighting Co.
Vapor Car Heating Co., Inc.
Westinghouse Electric & Mfg. Co.

Heating Equipment, Car.
Gold Car Heating & Lighting Co.
Vapor Car Heating Co., Inc.
Wine Railway Appliance Co.

Heating Systems, Car (Electric and Steam).
Gold Car Heating & Lighting Co.
Vapor Car Heating Co., Inc.
Wine Railway Appliance Co.

High Temperature Cements.
Carey & Co., Philip, The.

Highway Crossing Protection Devices.
American Bridge Co.
Franklin Railway Supply Co., Inc.
Griswold Signal Co.
Railroad Supply Co.

Hoists, Chain.
Milwaukee Electric Crane & Hoist Corp.
Ryerson & Son, Jos. T.

Hoists, Electric.
Milwaukee Electric Crane & Hoist Corp.

Hoists, Pneumatic.
Ingersoll-Rand Co.

Hoisting Machinery.
Industrial Brownhoist Corp.
Milwaukee Electric Crane & Hoist Corp.
Orton Crane & Shovel Co.

Hooks, Wrecking.
National Malleable & Steel Castings Co.

Horns, Pneuphonic.
Westinghouse Air Brake Co.

Hose, Air, Steam, Etc.
Ingersoll-Rand Co.
Westinghouse Air Brake Co.
Worthington Pump & Machinery Corp.

Hose, Oxy-Acetylene.
Oxweld Railroad Service Co., The.

Hose, Tender.
Westinghouse Air Brake Co.

Incandescent Lamps.
General Electric Supply Corp.

Indicators, Speed & Cut-off.
Valve Pilot Co.

Ingots.
Birdsboro Steel Foundry & Machine Co.
Carnegie Steel Co.
Edgewater Steel Co.
Illinois Steel Co.
McConway & Torley Co.
Standard Steel Works Co.

Injectors, Exhaust Steam.
Sellers & Co., Inc., Wm.
Superheater Co., The.

Inspection of Material and Equipment—(See Engineers, Inspection).

Insulated Wire.
American Steel & Wire Co.
Anaconda Wire & Cable Co.
General Electric Supply Corp.

Insulation, Car.
Carey Co., Philip, The.
Wood Conversion Co.

Insulation, Car, Bldg.
Carey Co., Philip, The.
JohnsManville Corp.
Lehon Co., The.
Tuco Products Corp.
Union Asbestos & Rubber Co.
Wood Conversion Co.

Insulation, Electrical.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Insulation, Exhaust & Heater Pipe.
Carey Co., Philip, The.
Johns-Manville Corp.
Tuco Products Corp.
Union Asbestos & Rubber Co.

Insulation, Heat.
Carey Co., Philip, The.
Miner, W. H.

Insulation Tape.
General Electric Supply Corp.

Insulators, Electrical, Porcelain.
Graybar Electric Co.
Westinghouse Elec. & Mfg. Co.

Interlocking Plant Equipment.
General Railway Signal Co.
Union Switch & Signal Co.

Iron Chain.
Falls Hollow Staybolt Co.
Lockhart Iron & Steel Co.
Ryerson & Son, Joseph T.

Iron, Charcoal.
Bethlehem Steel Co.
Ewald Iron Co.
Falls Hollow Staybolt Co.
Lockhart Iron & Steel Co.
Ryerson & Son, Joseph T.

Iron, Engine Bolt.
Lockhart Iron & Steel Co.
Ryerson & Son, Joseph T.

Iron, Forging Billets.
Lockhart Iron & Steel Co.

Iron, Hollow Staybolt.
Falls Hollow Staybolt Co.
Ryerson & Son, Joseph T.

Iron, Hollow Staybolt Bars.
Bethlehem Steel Co.
Falls Hollow Staybolt Co.
Ryerson & Son, Joseph T.

Iron, Pig.
Bethlehem Steel Co.

Iron, Refined.
Ewald Iron Co.
Falls Hollow Staybolt Co.
Lockhart Iron & Steel Co.
Reading Iron Co.
Ryerson & Son, Joseph T.

Iron, Staybolt — (See also Staybolts).
Ewald Iron Co.
Falls Hollow Staybolt Co.
Lockhart Iron & Steel Co.
Reading Iron Co
Ryerson & Son, Joseph T.

Jacking, Locomotive.
Carey Co., Philip, The

Jacking Method of Installing Pipe
Armco Culvert Manufacturers Association

Jacks, Smoke.
Carey Co., Philip, The.
Johns Manville Corp.

Joints, Air Reservoir.
Barco Mfg. Co.
Franklin Railway Supply Co., Inc.

Joints, Blow Off Line (Roundhouse).
Barco Mfg. Co.
Franklin Railway Supply Co., Inc.

Joints, Coach and Coach Yard.
Barco Mfg. Co.
Franklin Railway Supply Co., Inc.

Joints, Flexible.
Franklin Railway Supply Co., Inc.
Vapor Car Heating Co., Inc.

Joints, Flexible Ball.
Barco Mfg. Co.

Joints, Rail.
American Steel Foundries.
Carnegie Steel Co.
Illinois Steel Co.
Q & C Co., The.
Rail Joint Co.
Union Switch & Signal Co.

Joints, Steam, Air & Liquid.
Barco Mfg. Co.
Franklin Railway Supply Co., Inc.
Vapor Car Heating Co., Inc.

Joints, Swing.
Barco Mfg. Co.
Vapor Car Heating Co., Inc.

Journal Boxes and Lids.
Allegheny Steel Co.
American Steel Foundries.
Brill Co., The J. G.
Gould Coupler Co., The.
Hunt-Spiller Mfg. Corp.
National Malleable & Steel Castings Co.
Pullman Car & Mfg. Corp.
Railway Steel Spring Co.
Symington Co., The.
Union Spring & Mfg. Co.

Journal Oilers, Car & Locomotive.
Ardco Mfg. Co.

Keys, Brake Shoe.
Bradford Corporation.
Buffalo Brake Beam Co.
Mt. Vernon Car Mfg. Co.
Steel Car Forge Co.
Union Spring & Mfg. Co.

Knuckles, Emergency.
Q & C Co., The.

Laboratories, Testing.
Hunt Co., Robert W.
Pittsburgh Testing Laboratory.

Lacquers.
General Electric Supply Corp.
Sherwin-Williams Co.

Ladders, Steel Car.
Wine Railway Appliance Co.

Lagging, Locomotive.
Carey & Co., Philip, The.
Johns-Manville Corp.

Lamps, Incandescent.
General Electric Co.
Graybar Electric Co.
Westinghouse Elec. & Mfg. Co.

Lamps, Inspector's.
Oxweld Railroad Service Co., The.

Lath, Metal.
Armco Railroad Sales Co.

Lathes, Axle.
Sellers & Co., Inc., Wm

Lathes, Engine.
Ryerson & Son, Joseph T.

Lathes, Wheel.
Sellers & Co., Inc., Wm.

Lead, White.
National Lead Co.

Lighting Equipment, Car.
Electric Storage Battery Co.

Lighting Fixtures and Systems.
General Electric Supply Corp.
Graybar Electric Co.
Pyle-National Co.

Lighting Plants, Gas, Electric
Pyle-National Co., The.
Sunbeam Electric Mfg. Co

Lightning Arresters.
General Electric Supply Corp.

Line Material.
Graybar Electric Co.
Westinghouse Elec. & Mfg. Co.

Lock Nuts—(See Nut Locks)

Locomotive Jacket Sheets.
Armco Railroad Sales Co.

Locomotive Water Conditioners
Bird-Archer Co., The.

Locomotives, Contractors.
American Locomotive Co.
Baldwin Locomotive Works.
Lima Locomotive Works.

Locomotives, Electric.
American Locomotive Co.
Baldwin Locomotive Works.
General Electric Co.
Westinghouse Elec. & Mfg. Co.

Locomotives, Gasoline.
Baldwin Locomotive Works.

Locomotives, Gas-Electric.
Brill Co., The J. G.
Electro-Motive Co.

Locomotives, Geared.
Lima Locomotive Works.

Locomotives, Industrial.
American Locomotive Co.
Baldwin Locomotive Works.
General Electric Co.
Lima Locomotive Works.
Westinghouse Elec. & Mfg. Co.

Locomotives, Mine.
American Locomotive Co.
Baldwin Locomotive Works.
General Electric Co.
Lima Locomotive Works.
Westinghouse Elec. & Mfg. Co.

Locomotives, Oil Engine, Electric Driven.
American Locomotive Co.
Baldwin Locomotive Works.
General Electric Co.
Ingersoll-Rand Co.
Westinghouse Elec. & Mfg. Co.
Whitcomb Co., Geo. D. The.

Locomotives, Rebuilt.
American Locomotive Co.
Locomotives, Repair Parts.
American Locomotive Co.
Baldwin Locomotive Works.
Lima Locomotive Works.
Locomotives, Steam.
American Locomotive Co.
Baldwin Locomotive Works.
Lima Locomotive Works.
Locomotive Stokers.
Standard Stoker Co.
Locomotive Valve Pilot.
Valve Pilot Co.
Lubricators, Driving Box.
Franklin Railway Supply Co., Inc.
Lubricators, Piston Rod.
Q & C Co., The.
Lumber, Asbestos.
Carey & Co., Philip, The.
Johns-Manville Corp.
Lumber, Treated.
American Creosoting Co.
Central Coal & Coke Co.
Century Wood Preserving Co.
(Division of the Wood Preserving Corp.)
Curtin-Howe Corp.
Industrial Lumber & Creosoting Co.
International Creosoting & Construction Co.
National Lumber & Creosoting Co.
Southern Wood Preserving Co.
Machinery, Hydraulic.
Birdsboro Steel Foundry & Mach. Co.
Machine Screws, Monel Metal
International Nickel Co., The.
Magnets, Lifting.
Industrial Brownhoist Corp.
Electro Metallurgical Sales Corp.
Mechanical Draft Apparatus—(See Heating and Vent. App.).
Mechanical Stokers.
Standard Stoker Co.
Melters, Snow, Electric.
Q & C Co., The.
Metallic Flexible Conduit.
General Electric Supply Corp.
Meters, Water & Oil.
Worthington Pump & Machinery Corp.
Milling Machines, Planer Type.
Sellers & Co., Inc., Wm.
Milling Machines, Plain and Universal.
Ryerson & Son, Joseph T.
Milling Machines, Portable Frame Jaw.
Micro Machine Co.
Mohair Upholstery Velvets.
Chase & Co., L. C.
Massachusetts Mohair Plush Co.
Molybdenum Metal.
Vanadium Corp. of America.
Monel Metal, Rods, Sheets, Tubes, Wire, etc.
International Nickel Co., The.
Motors, Electric.
Fairbanks-Morse & Co.
General Electric Co.
Graybar Electric Co.
Westinghouse Elec. & Mfg. Co.
Motors & Generators.
Fairbanks-Morse & Co.
Moulding.
Aluminum Co. of America.
Multiple V Belt Drives.
Worthington Pump & Machinery Corp.
Nails.
American Steel & Wire Co.
Reading Iron Co.
Ryerson & Son, Joseph T.
Nipples, Air Hose.
Prime Manufacturing Co.
Nozzles, Exhaust.
Franklin Railway Supply Co., Inc.
Nozzles, Oxy-Acetylene Cutting.
Oxweld Railroad Service Co., The.
Nuts—(See Bolts and Nuts).
Nut Locks.
Dardelet Threadlock Corp.
Grip Nut Co.
Nuts, Tank Hose.
Prime Manufacturing Co., The.
Office Appliances.
Remington-Rand Business Service.
Oils, Diesel Engine
Vacuum Oil Co.
Oil, Dynamo
Vacuum Oil Co.
Oil-Electric Locomotives.
American Locomotive Co.
General Electric Co.
Ingersoll-Rand Co.
Westinghouse Elec. & Mfg. Co.
Oil Filtering & Storage Systems.
Graver Tank & Mfg. Corp
Oils & Greases, Engine
Vacuum Oil Co.
Oils & Greases, Lubricating
Vacuum Oil Co.
Oils & Greases, Motor
Vacuum Oil Co.
Oil, Linseed.
National Lead Co.
Oils, Locomotive Valve
Vacuum Oil Co.
Oil Plugs, Steam Chest.
Franklin Railway Supply Co., Inc.
Oil, Turbine
Vacuum Oil Co.
Oxy-Acetylene Apparatus.
Oxweld Railroad Service Co., The.
Oxygen.
Oxweld Railroad Service Co., The.
Packing.
Westinghouse Air Brake Co.
Packing, Air Pump.
Johns-Manville Corp.
Pilot Packing Co.
Union Asbestos & Rubber Co.
Westinghouse Air Brake Co.
Packing, Asbestos.
Packing, Cylinder and Valve Ring.
Johns-Manville Corp.
Hunt-Spiller Mfg. Corp.
Westinghouse Air Brake Co.
Packing, Locomotive Cab Cock.
Johns-Manville Corp.
Union Asbestos & Rubber Co.
Packing, Ring Boiler.
Union Asbestos & Rubber Co.
Packing, Semi-Metallic.
Pilot Packing Co.
Central Alloy Steel Corp.
Packing, Sheet.
Johns-Manville Corp.
Union Asbestos & Rubber Co.
Packing, Soft.
Carey & Co., Philip, The.
Johns-Manville Corp.
Pilot Packing Co.
Union Asbestos & Rubber Co.
Packing, Throttle.
Johns-Manville Corp.
Union Asbestos & Rubber Co.
Paint Burners, Acetylene.
Oxweld Railroad Service Co., The.
Paint, Metal Protective.
Lowe Bros. Co., The.
National Lead Co.
Sherwin-Williams Co.
Paint, Powder.
Aluminum Co. of America.
Paint Spraying Equipment.
De Vilbiss Mfg. Co., The.
Paints.
Lowe Bros. Co., The.
National Lead Co.
Sherwin-Williams Co.
Paper, Carbon.
Remington-Rand Business Service.
Paper, Sheathing.
Carey & Co., Philip, The.
Patterns, for Iron, Steel & Brass Castings.
Baldwin Locomotive Works, The.
Pavement Breakers.
Ingersoll-Rand Co.
Worthington Pump & Machinery Corp.
Pickling Equipment, Monel Metal.
International Nickel Co., The.
Pile Drivers.
Industrial Brownhoist Corp.
Orton Crane & Shovel Co.
Piling, Treated.
American Creosoting Co.
Century Wood Preserving Co.
(Division of the Wood Preserving Corp.)
Curtin-Howe Corp.
International Creosoting & Construction Co.
National Lumber & Creosoting Co.
Piling, Sheet Steel.
American Bridge Co.
Carnegie Steel Co.
Inland Steel Company
Piling, Wood.
National Lumber & Creosoting Co.
Pilot Beams, Cast Steel.
General Steel Castings Corp.
Gould Coupler Co., The.
Pilots, Cast Steel.
General Steel Castings Corp.
Locomotive Finished Material Co.
Pins, Air Brake & Clevis.
Champion Rivet Co.
Pins, Center.
Miner, W. H.
Pins, Coupler Knuckle.
Champion Rivet Co.
McConway & Torley Co.
National Malleable & Steel Castings Co.
Pins, Crank.
American Locomotive Co.
Baldwin Locomotive Works.
Miner, Inc., W. H.
Standard Steel Works Co.
Union Asbestos & Rubber Corp.
Pipe, Corrugated Iron
Armco Culvert Manufacturers Association
Pipe, Paved Invert
Armco Culvert Manufacturers Association
Pipe Coverings.
Carey & Co., Philip, The.
Johns-Manville Corp.
Keasby & Mattison Co.
Pipe Fittings—(See Fittings, Pipe).
Pipe, Metal Culvert.
Armco Railroad Sales Co.
American Sheet & Tin Plate Co.
Republic Steel Corp.
Pipe, Perforated Iron
Armco Culvert Manufacturers Association
Pipe, Spiral Welded.
Armco Railroad Sales Co.
Pipe, Steel Signal.
National Tube Co.
Pipe, Spiral Welded.
Armco Railroad Sales Co.
Pipe, Wrought Iron.
Byers Co., A. M.
Reading Iron Co.
Planers, Plate.
Ryerson & Son, Jos. T.
Sellers & Co., Inc., Wm.
Plates.
Steel Car Forge Co.
Plates, Follower.
Steel Car Forge Co.
Plates, Boiler, Firebox—(See Steel Firebox).
Plates, Center—(See Bearings, Center).
Plates, Iron & Steel.
Armco Railroad Sales Co.
Carnegie Steel Co.
Illinois Steel Co.
Inland Steel Co.
Ryerson & Son, Joseph T.
Plate & Sheet Metal Work.
Baldwin Locomotive Works, The.
Plates, Tie.
Illinois Steel Co.
Inland Steel Company.
Railroad Supply Co.
Tennessee Coal, Iron & Railroad Co.
Plates, Tin and Terne.
American Sheet & Tin Plate Co.
Platforms, Car.
Gould Coupler Co., The.
Standard Coupler Co.
Platforms, Cast Steel, Passenger Car.
General Steel Castings Corp.
Plows, Railroad and Grading.
Western Wheeled Scraper Co.
Plows, Snow.
American Locomotive Co.
Brill Co., The J. G.
Q & C Co., The.
Plush, Mohair.
Chase & Co., L. C.
Massachusetts Mohair Plush Co.
Pneumatic Tools.
Ingersoll-Rand Co.
Poles, Creosoted.
National Lumber & Creosoting Co.
Poles, Power Distribution.
National Lumber & Creosoting Co.
Poles, Preservatively Treated.
National Lumber & Creosoting Co.
Poles, Signal.
American Creosoting Co.
Century Wood Preserving Co.
(Division of the Wood Preserving Corp.)
Curtin-Howe Corp.
General Railway Signal Co.
International Creosoting & Construction Co.
National Lumber & Creosoting Co.
Southern Wood Preserving Co.
Union Switch & Signal Co.
Poles, Steel Tubular.
Graybar Electric Co.
National Tube Co.
Poles, Telegraph.
National Lumber & Creosoting Co.
Poles, Transmission.
National Lumber & Creosoting Co.
Poles, Treated.
American Creosoting Co.
Central Coal & Coke Co.
Century Wood Preserving Co.
(Division of the Wood Preserving Corp.)
General Electric Supply Corp.
Curtin-Howe Corp.
Graybar Electric Co.
International Creosoting & Construction Co.
National Lumber & Creosoting Co.
Southern Wood Preserving Co.
Poles, Wood
International Creosoting & Construction Co.
National Lumber & Creosoting Co.
Posts, Farm.
National Lumber & Creosoting Co.
Posts, Fence, Treated.
Century Wood Preserving Co.
(Division of the Wood Preserving Corp.)
Curtin-Howe Corp.
Inland Steel Co.
International Creosoting & Construction Co.
National Lumber & Creosoting Co.
Southern Wood Preserving Co.
Posts, Highway.
National Lumber & Creosoting Co.
Posts, Steel Fence.
American Steel & Wire Co.
Q & C Co., The.
Posts, Wood.
National Lumber & Creosoting Co.
Powder, Blasting—(See Explosives).
Powdered Coal Equipment.
Muhlfeld, John E.
Power Plants.
General Electric Co.
Muhlfeld, John E.
United Engineers & Constructors, Inc.
Westinghouse Elec. & Mfg. Co.
Power Transmission Supplies.
Sellers & Co., Inc., Wm.
Preservatives, Wood.
Century Wood Preserving Co.
(Division of the Wood Preserving Corp.)
Curtin-Howe Corp.
National Lumber & Creosoting Co.
Presses, Flanging Hydraulic.
Birdsboro Steel Foundry & Machine Co.
Presses, Hydraulic.
Baldwin-Southwark Corp.
Birdsboro Steel Foundry & Machine Co.
Presses, Wheel.
Birdsboro Steel Foundry & Machine Co.
Sellers & Co., Inc., Wm.
Pulverizers, Coal — (See Crushers, Coal).
Pumping Stations.
Fairbanks-Morse & Co.
Pump Liners, Monel Metal.
International Nickel Co., The.
Pump Rods, Monel Metal.
International Nickel Co., The.
Pump Shafts, Monel Metal.
International Nickel Co., The.
Pumps, Hydraulic.
Ingersoll-Rand Co.
Worthington Pump & Machinery Corp.
Pumps & Pumping Mchy.
Fairbanks-Morse & Co.
Ingersoll-Rand Co.
Westinghouse Air Brake Co.
Worthington Pump & Machinery Corp.
Poles, Creosoted.
National Lumber & Creosoting Co.
Pumps, Vacuum.
Ingersoll-Rand Co.
Worthington Pump & Machinery Corp.
Punching and Shearing Machines.
Ryerson & Son, Joseph T
Pushers, Coal.
Standard Stoker Co.
Pyrometers, Superheated Steam.
Superheater Co., The.
Rail Anchors.
Bethlehem Steel Co.
P. & M. Co., The.
Rail-Bonds.
American Steel & Wire Co
General Electric Co.
General Railway Signal Co
Graybar Electric Co.
Railroad Supply Co.
Union Switch & Signal Co
Westinghouse Elec. & Mfg Co.
Rail Braces — (See Braces Rail).
Rail Reclamation Equipment
Ryerson & Son, Joseph T
Railroad Shops.
United Engineers & Constructors, Inc.
Rail Splice Plates — (See Joints. Rail).
Railroad Structures — (See Engineers and Contractors; also Building).
Rails.
Bethlehem Steel Co.
Carnegie Steel Co.
Illinois Steel Co.
Inland Steel Co.
Ryerson & Son, Inc. Joseph T.
Tennessee Coal, Iron & Railroad Co.
Thomson Rail Corp.
Railway Signals.
General Electric Supply Corp.
Rattan.
Hale-Kilburn Co.
Heywood-Wakefield Co.
Receivers, Air.
Ingersoll-Rand Co.
Westinghouse Air Brake Co.
Recorders, Speed & Cut-off.
Valve Pilot Co.
Rectifiers for Signal Work
General Electric Co.
Railroad Supply Co.
Union Switch & Signal Co
Reducing Valves.
Vapor Car Heating Co., Inc.
Reflectors, Headlight.
Pyle-National Co., The.
Sunbeam Electric Mfg. Co
Refrigerators.
Wine Railway Appliance Co.
Regulators, Oxy-Acetylene.
Oxweld Railroad Service Co., The.

Relays.
General Railway Signal Co.
Railroad Supply Co.
Union Switch & Signal Co.
Westinghouse Elec. & Mfg. Co.

Removers, Paint & Varnish.
Oakite Products, Inc.

Repair Parts, Stoker.
Standard Stoker Co.
Q & C Company, The.

Retorts, Creosoting.
Graver Tank & Mfg. Corp.

Reverse Gear, Power.
Barco Mfg. Co.
Franklin Railway Supply Co., Inc.

Rivet Cutters.
Ingersoll-Rand Co.

Riveters, Hydraulic.
Birdsboro Steel Foundry & Machine Co.

Riveting Machines.
Ingersoll-Rand Co.

Rivets.
Inland Steel Co.
Neely Nut & Bolt Co.
Ryerson & Son, Joseph T.
Pressed Steel Car Co.
Russell, Burdsall & Ward Bolt and Nut Co.

Rods.
Neely Nut & Bolt Co.

Rolled Steel.
Carnegie Steel Co.

Roller Bearings—(See Bearings, Roller).

Rolls, Bending & Straightening.
Birdsboro Steel Foundry & Machine Co.

Roof Slabs, Concrete.
Federal American Cement Tile Co.

Roofing, Asbestos.
Carey & Co., Philip, The.
Johns-Manville Corp.
Lehon Co., The.

Roofing, Buildings.
Armco Railroad Sales Co.
Carey Co., Philip, The.
Lehon Co., The.
Johns-Manville Corp.
Superior Sheet Steel Co., The (Division of Continental Steel Corp.).

Roofing, Car.
Armco Railroad Sales Co.
American Sheet & Tin Plate Co.
Carey & Co., Philip, The.
Hutchins Car Rfg. Co.
Johns-Manville Corp.
Lehon Co., The.
Superior Sheet Steel Co., The (Division of Continental Steel Corp.).
Tuco Products Corp.
Union Metal Products Co.

Roofing, Corrugated.
Armco Railroad Sales Co.
American Sheet & Tin Plate Co.
Carey Co., Philip, The.
Johns-Manville Corp.

Roofing, Tile.
Federal American Cement Tile Co.

Roofing, Tile, Cement.
Federal American Cement Tile Co.

Roofing, Tin.
American Sheet & Tin Plate Co.

Rope, Wire — (See Wire Rope).

Rust Preventatives.
Dearborn Chemical Co.
Oakite Products, Inc.

Safe Ends.
National Tube Co.

Sand Drying Plants.
Roberts & Schaefer Co.

Sanitary Products.
West Disinfecting Co.

Sash Balances.
Tuco Products Co.

Saws, Circular Metal.
Ryerson & Son, Joseph T.

Saws, High Speed, Friction.
Ryerson & Son, Joseph T.

Saws, Portable Rail.
Industrial Brownhoist Corp.
Q & C Co., The.

Scales.
Fairbanks-Morse & Co.

Scrapers, Wheeled and Drag.
Western Wheeled Scraper Co.

Screens, Passenger Car.
Tuco Products Corp.

Seats, Car.
Brill Co., The J. G.
Hale-Kilburn Co.
Heywood-Wakefield Co.

Seats, Coach.
Brill Co., The J. G.

Shafting.
Falls Hollow Staybolt Co.
Ryerson & Son, Joseph T.
Sellers & Co., Inc., Wm.
Standard Steel Works Co.

Shapers.
Ryerson & Son, Joseph T.

Shapes, Pressed Steel.
Pressed Steel Car Co.
Sellers & Co., Inc., Wm.

Shapes, Structural.
Bethlehem Steel Co.
Carnegie Steel Co.
Illinois Steel Co.
Inland Steel Co.
Ryerson & Son, Joseph T.

Sheds, Train.
American Bridge Co.
Inland Steel Co.

Sheets, Black and Galvanized.
Allegheny Steel Co.
American Sheet & Tin Plate Co.
Armco Railroad Sales Co.
Inland Steel Co.
Republic Steel Corp.
Ryerson & Son, Joseph T.

Sheets, Blue Annealed.
Allegheny Steel Co.

Sheets, Building, Special Car, Corrugated & Plain.
Armco Railroad Sales Co.

Sheets, Corrugated.
American Sheet & Tin Plate Co.
Armco Railroad Sales Co.
Carey Co., Philip, The.
Carnegie Steel Co.
Johns-Manville Corp.
Ryerson & Son, Joseph T.

Sheets, Corrugated & Plain.
Inland Steel Co.
Ryerson & Son, Joseph T.

Sheets, Electrical.
American Sheet & Tin Plate Co.
Armco Railroad Sales Co.
Republic Steel Corp.
Ryerson & Son, Joseph T.

Sheets, Iron & Steel.
Armco Railroad Sales Co.
Bethlehem Steel Co.
Superior Sheet Steel Co., The (Division of Continental Steel Corp.).

Sheets, Locomotive Jacket.
American Sheet & Tin Plate Co.
Armco Railroad Sales Co.
Inland Steel Co.
Ryerson & Son, Inc., Joseph T.

Sheets, Polished or Planished Iron.
Armco Railroad Sales Co.
American Sheet & Tin Plate Co.

Sheets, Steel.
Armco Railroad Sales Co.
Inland Steel Co.
Ryerson & Son, Joseph T.

Sherardising Plants.
General Electric Co.

Shop Calling Systems—(See Systems, Communication).

Shops, Railroad—(See Buildings, Iron, Steel and Steel Concrete).

Shovels & Draglines.
Industrial Brownhoist Corp.

Shovels, Steam, Gasoline & Electric.
Orton Crane & Shovel Co.

Siding, Iron & Steel.
Armco Railroad Sales Co.

Siding., Bldg., Car, Corrugated & Plain.
Kinnear Mfg. Co.
Armco Railroad Sales Co.
American Sheet & Tin Plate Co.
Inland Steel Co.
Ryerson & Son, Inc., Joseph T.

Siding, Corrugated & Plain.
Carey & Co., Philip, The.
Johns-Manville Corp.

Signal Accessories.
Electric Storage Battery Co.
General Electric Co.
General Railway Signal Co.
Graybar Electric Co.
Railroad Supply Co.
Union Switch & Signal Co.
Westinghouse Elec. & Mfg. Co.

Signals, Automatic Cab.
General Railway Signal Co.
Union Switch & Signal Co.

Signal Blades.
General Railway Signal Co.
Union Switch & Signal Co.

Signals, Crossing.
Union Switch & Signal Co.

Signals, Crossing Protection.
General Railway Signal Co.
Railroad Supply Co.

Signals, Railway.
General Electric Co.
Union Switch & Signal Co.

Sign Posts, Treated.
Century Wood Preserving Co.
(Division of the Wood Preserving Corp.)
National Lumber & Creosoting Co.

Signs, Highway Crossing.
Railroad Supply Co.

Silico Manganese.
Vanadium Corp. of America.

Slabs, Concrete Floor.
Federal Cement Tile Co.

Slag, Blast Furnace.
Carnegie Steel Co.

Slotting Machines.
Sellers & Co., Inc., Wm.

Slotting Machines, Locomotive Cylinder.
American Steel & Wire Co.

Sludge Removers.
Bird-Archer Co., The.

Soap, Liquid.
West Disinfecting Co.

Solder.
National Bearing Metals Corp.
Ryerson & Son, Inc., Joseph T.
Westinghouse Elec. & Mfg. Co.

Spark Arresters.
Locomotive Firebox Co.

Speed Indicators & Recorders.
Valve Pilot Corp.

Spelter—(See Zinc).

Spikes.
American Steel & Wire Co.
Bethlehem Steel Co.
Illinois Steel Co.
Inland Steel Co.
Ryerson & Son, Joseph T.

Splice Bars, Angle.
Carnegie Steel Co.
Illinois Steel Co.
Inland Steel Co.

Spring Plates or Seats.
Allegheny Steel Co.
National Malleable & Steel Castings Co.
Union Spring & Mfg. Co.

Springs.
American Steel Foundries Co.
American Steel & Wire Co.
Baldwin Locomotive Works, The.
Pittsburgh Spring & Steel Co.
Railway Steel Spring Co.
Standard Steel Works Co.
Union Spring & Mfg. Co.
Union Switch & Signal Co.

Springs, Shop Equipment.
Ryerson & Son, Joseph T.

Springs, Vanadium Steel.
Pittsburgh Spring & Steel Co.
Union Spring & Mfg. Co.

Stacks, Steel.
American Bridge Co.
Graver Tank & Mfg. Corp.

Stands, Switch & Target.
Q & C Co., The.

Staybolts.
American Locomotive Co.
Ewald Iron Co.
Ryerson & Son, Joseph T.

Staybolts, Hollow.
Falls Hollow Staybolt Co.
Ryerson & Son, Joseph T.

Steam Chests.
Franklin Railway Supply Co., Inc.

Steam Enclosures, Corrugated Iron.
Republic Steel Corp.

Steam Shovels.
Orton Crane & Shovel Co.

Steel Alloy.
Illinois Steel Co.
Ryerson & Son, Joseph T.
Republic Steel Corp.
Standard Steel Works Co.

Steel, Firebox.
Carnegie Steel Co.
Illinois Steel Co.

Steel & Iron, Stainless.
Allegheny Steel Co.

Steel, Open Hearth.
Carnegie Steel Co.
Illinois Steel Co.

Steel Plate Construction.
Graver Tank & Mfg. Corp.

Steel, Pressed Specialties.
Hale-Kilburn Co.

Steel, Structural.
American Bridge Co.
Carnegie Steel Co.
Graver Tank & Mfg. Corp.
Illinois Steel Co.
Inland Steel Co.
Ryerson & Son, Joseph T.

Steel, Tool.
Illinois Steel Co.
Midvale Co., The.
Q & C Co., The.
Ryerson & Son, Joseph T.

Step Joints.
Q & C Co., The.
Rail Joint Co.

Steps, Car—(See Car Steps, Safety).

Stokers, Locomotive.
Lower Stoker Co.
Standard Stoker Co.

Stokers, Mechanical.
Westinghouse Elec. & Mfg. Co.

Stoker Repair Parts.
Lower Stoker Co.
Standard Stoker Co.

Storm Sewers, Corrugated Iron.
Republic Steel Corp.

Strainer, Air.
Westinghouse Air Brake Co.

Strainers, Tank Hose.
Prime Mfg. Co., The.

Stringers, Bridge, Treated.
American Creosoting Co.
Central Coal & Coke Co.
Century Wood Preserving Co.
(Division of the Wood Preserving Corp.)
Curtin-Howe Corp.
International Creosoting & Construction Co.
National Lumber & Creosoting Co.

Structural Shapes, Rolled Shapes.
Carnegie Steel Co.

Superheaters.
Superheater Co., The.

Supports, Bottom Rod Safety.
Chicago Railway Equipment Co.

Switch Boards.
Graybar Electric Co.
Johns-Manville Corp.
Westinghouse Elec. & Mfg. Co.

Switch Machines.
General Railway Signal Co.

Switch Movements.
Union Switch & Signal Co.

Switch Ties, Treated.
American Creosoting Co.
Century Wood Preserving Co.
(Division of the Wood Preserving Corp.)
Curtin-Howe Corp.
International Creosoting & Construction Co.
National Lumber & Creosoting Co.
Southern Wood Preserving Co.

Switches, Electric.
Electric Service Supplies Co.
General Electric Co.
Graybar Electric Co.
Westinghouse Elec. & Mfg. Co.

Switches & Switch Stands.
Ramapo Ajax Corp.

Syphons, Corrugated Iron.
Republic Steel Corp.

Syphons, Locomotive.
Locomotive Firebox Co.

Syphons, Locomotive, Boilers
Locomotive Firebox Co.

Tables, Welding.
Oxweld Railroad Service Co., The.

Tables, Welding.
Oxweld Railroad Service Co., The.

Tamping Machines, Tie.
Ingersoll-Rand Co.

Tamping Outfits, Tie.
Ingersoll-Rand Co.

Tank Cars.
General American Tank Car Corp., The.

Tanks, Acetylene, Gas.
Oxweld Railroad Service Co., The.

Tanks, Air, Gas, Oil and Water.
Baldwin Locomotive Works, The.
Graver Tank & Mfg. Corp.

Tanks, Water.
American Bridge Co.
American Locomotive Co.
National Tube Co.
Pressed Steel Car Co.
Westinghouse Air Brake Co.

Tape, Insulation.
Johns-Manville Corp
Westinghouse Elec. & Mfg. Co.

Taps, Staybolt.
Ryerson & Son, Joseph T.

Tele. & Tele. Wire.
American Steel & Wire Co.
Anaconda Wire & Cable Co.
General Electric Supply Corp.

Terminals, Railroad.
United Engineers & Constructors, Inc.

Testers, Boiler.
Sellers & Co., Inc., Wm.

Testers, Gage.
Ashton Valve Co.

Testers, Rail.
Sperry Products, Inc.

Testers, Staybolt.
Flannery Bolt Co.

Testing Machines.
Baldwin-Southwark Corp.

Thermostats.
Gold Car Heating & Lighting Co.
Vapor Car Heating Co., Inc.

Tie Plates.
Bethlehem Steel Co.
Illinois Steel Co.
Inland Steel Company
Railroad Supply Co.

Ties, Creosoted.
International Creosoting & Construction Co.
National Lumber & Creosoting Co.
Southern Wood Preserving Co.

Ties, Steel.
American Bridge Co.
Bethlehem Steel Co.
Carnegie Steel Co.

Ties, Treated.
American Creosoting Co.
Century Wood Preserving Co. (Division of the Wood Preserving Corp.)
Curtin-Howe Corp.
International Creosoting & Construction Co.
National Lumber & Creosoting Co.
Southern Wood Preserving Co.

Tile, Cement, Concrete.
Federal American Cement Tile Co.

Timbers, Pre-framed, Treated
National Lumber & Creosoting Co.

Timber, Treated.
American Creosoting Co.
Central Coal & Coke Co.
Century Wood Preserving Co. (Division of the Wood Preserving Corp.)
Curtin-Howe Corp.
International Creosoting & Construction Co.
National Lumber & Creosoting Co.
Southern Wood Preserving Co.
Wood Conversion Co.

Tires.
Firestone Tire & Rubber Co.
General Tire & Rubber Co.
Goodyear Tire & Rubber Co.
Goodrich Rubber Co., B. F.

Tires, Steel.
Edgewater Steel Co.
Midvale Co., The.
Railway Steel Spring Co.
Standard Steel Works Co.

Toilet Papers
U. S. Envelope Co.

Tools, High Speed Steel.
Bethlehem Steel Co.
Bird-Archer Co., The.

Towers, Floodlight.
Pyle-National Co.

Track Skates.
Q & C Co., The.

Tractors.
Caterpillar Tractor Co.
Elwell-Parker Electric Co.
Industrial Lumber Co.
International Creosoting & Construction Co.

Tractors, Industrial.
Elwell-Parker Electric Co.
International Harvester Co.

Tractors, Turntable.
Nichols & Bro., Geo. P.

Train Control Systems.
General Railway Signal Co.
Union Switch & Signal Co.

Tramways, Wire Rope.
American Steel & Wire Co.

Transfer Tables.
American Bridge Co.
Industrial Brownhoist Corp.
Nichols & Bro., Geo. P.

Transformers.
General Electric Supply Corp.
Railroad Supply Co.
Westinghouse Elec. & Mfg. Co.

Trap Doors.
Edwards Co., O. M.

Trap Doors & Fixtures.
Tuco Products Corp.

Traps, Steam.
Johns-Manville Corp.

Treads, Bridge Floor.
Carnegie Steel Co.

Treads, Safety.
Ryerson & Son, Joseph T.

Treatment Water—(See Water Softening and Purifying).

Truck Frames—(See Frames, Truck).

Trucks, Oxy-Acetylene Supply.
Oxweld Railroad Service Co., The.

Trucks, Car and Locomotive.
American Locomotive Co.
American Steel Foundries.
Baldwin Locomotive Works.
Bettendorf Company, The.
Birdsboro Steel Foundry & Machine Co.
Brill Co., The J. G.
Flexible Truck Co.
Franklin Railway Supply Co., Inc.
Gould Coupler Co.
Mt. Vernon Car Mfg. Co.
Pressed Steel Car Co.
Standard Car Truck Co.
Symington Co., The.

Trucks, Cast Steel Tender.
General Steel Castings Corp.

Trucks, Cast Steel, Electric Car.
General Steel Castings Corp.

Trucks, Cast Steel, Car and Locomotive.
General Steel Castings Corp.

Trucks, Electric Storage Battery.
Elwell-Parker Electric Co.

Trucks, Industrial.
Elwell-Parker Electric Co.

Trucks, Motor.
Dodge Motor Truck Corp.
General Motors Truck Co.
International Harvester Co.
Reo Motor Car Co.
White Co., The.

Trucks, Tender.
Flexible Truck Co.

Trucks, Trailer.
Brill Co., The J. G.
Franklin Railway Supply Co., Inc.

Tubes, Arch.
National Tube Co.

Tubes, Boiler.
Allegheny Steel Co.
Armco Railroad Sales Co.
Bethlehem Steel Co.
Globe Steel Tubes Co.
National Tube Co.
Ryerson & Son, Joseph T.

Tubes, Boiler, Charcoal Iron.
Bethlehem Steel Co.
Reading Iron Co.

Tubes, Staybolt.
Falls Hollow Staybolt Co.

Tubes, Tire.
Firestone Tire & Rubber Co.
Goodyear Tire & Rubber Co.

Tubing.
Aluminum Co. of America.

Tubing, Seamless Steel.
National Tube Co.

Tungsten Metal.
Vanadium Corp. of America.

Turbo Generators.
Electric Service Supplies Co.
General Electric Co.
Pyle-National Co.
Sunbeam Electric Mfg. Co.
Westinghouse Elec. & Mfg. Co.

Turnbuckles.
American Bridge Co.
American Steel & Wire Co.
Ryerson & Son, Joseph T.

Turntable Tractors.
Nichols & Bro., Geo. P.

Turntables.
American Bridge Co.
Industrial Brownhoist Corp.
Nichols & Bro., Geo P.

Typewriter Ribbons.
Remington-Rand Business Service.

Typewriters.
Remington-Rand Business Service.

Uncoupling Device.
Hutchins Car Rfg. Co.

Undercrossings, Corrugated Iron.
Republic Steel Corp.

Underfloor Duct.
General Electric Supply Corp.

Underfloor Duct, Fibre and Metal.
Johns-Manville Corp.

Underframes, Cast Steel, Tender.
General Steel Castings Corp.

Underframes, Cast Steel, Freight Car.
General Steel Castings Corp.

Underframes, Steel.
Bettendorf Co., The.
Brill Co., The J. G.
Pressed Steel Car Co.
St. Louis Car Co.

Underground Conduit.
General Electric Supply Corp.

Upholstery, Car.
Brill Co., The J. G.
Chase & Co., L. C.
Massachusetts Mohair Plush Co.

Valve Caps.
Schrader's Son, Inc., A.

Valve Gears, Locomotive.
Pyle-National Co.

Valves, Air Brake.
Westinghouse Air Brake Co.

Valves, Back Pressure Acetylene.
Oxweld Railroad Service Co., The.

Valves, Blow-Off.
Bird-Archer Co., The.

Valves, Check & Angle Steam
Sellers & Co., Inc., Wm.

Valves, Drifting.
Ardco Mfg. Co.
Sellers & Co., Inc., Wm.

Valves, Hydraulic.
Birdsboro Steel Foundry & Machine Co.

Valves, Piston.
Franklin Railway Supply Co., Inc.

Valves, Pop, Safety & Relief.
Ashton Valve Co.
Vapor Car Heating Co., Inc.
Westinghouse Air Brake Co.

Valves, Pressure Regulating.
Gold Car Heating & Lighting Co.

Valves, Throttle.
American Throttle Co., Inc.
Bradford Corporation.

Valves, Fire.
Schrader's Son, Inc., A.

Varnish Powder.
Aluminum Co. of America.

Varnishes.
General Electric Supply Corp.
Lowe Bros. Co., The
Sherwin-Williams Co.
Vapor Car Heating Co., Inc.
Wine Railway Appliance Co.

Ventilators, Car.
Gold Car Heating & Lighting Co.

Ventilators, Shop & Roundhouse.
Carey Co., Philip, The.
Johns-Manville Corp.

Wardrobes, Rolling and Disappearing Front — (See Lockers).

Washers.
National Malleable & Steel Castings Co.
Ryerson & Son, Joseph T.
Wine Railway Appliance Co.

Washers, Boiler.
Sellers & Co., Inc., Wm.

Waterproofing Materials and Compounds.
Carey Co., Philip, The.
Johns-Manville Corp.
Lehon Co., The.

Water Purifying Materials & Compounds.
Bird-Archer Co., The.
Dearborn Chemical Co.

Water Softening & Purifying.
Bird-Archer Co., The.
Dearborn Chemical Co.
Graver Tank & Mfg. Corp.
Permutit Co., The.

Weather Stripping.
Tuco Products Corp.

Wedges, Automatic.
Franklin Railway Supply Co., Inc.

Wedges, Journal Box.
American Steel Foundries.
Gould Coupler Co.
National Malleable & Steel Castings Co.
Pressed Steel Car Co.
Symington Co., The.

Weed Killer.
Q & C Co., The.

Welding, Electric.
Electric Railweld Service Corp.

Welding Machines, Acetylene.
Oxweld Railroad Service Co., The.
Ryerson & Son, Joseph T.
Westinghouse Elec. & Mfg. Co.

Welding Machines, Electric.
General Electric Co.
Ryerson & Son, Joseph T.

Welding Machines, Flue.
Ryerson & Son, Joseph T.

Welding Materials.
Oxweld Railroad Service Co.
Franklin Railway Supply Co., Inc.

Welding Process.
Oxweld Railroad Service Co.

Welding Rods.
American Steel & Wire Co.
General Electric Supply Corp.
Oxweld Railroad Service Co., The.
Ryerson & Son, Joseph T.

Welding Supplies.
General Electric Co.
Oxweld Railroad Service Co., The.

Welding and Cutting Apparatus—(See Cutting and Welding Apparatus).

Well Casings, Corrugated Iron.
Armco Culvert Mfrs. Assoc.
Republic Steel Corp.

Wheel Centers, Driving.
American Locomotive Co.
American Steel Foundries.
Baldwin Locomotive Works, The.
Birdsboro Steel Foundry & Machine Co.
Edgewater Steel Co.
Hunt-Spiller Mfg. Corp.
Standard Steel Works Co.
Union Steel Casting Co.

Wheels, Car and Locomotive.
American Locomotive Co.
American Steel Foundries.
Baldwin Locomotive Works, The.
Bethlehem Steel Co.
Carnegie Steel Co.
Edgewater Steel Co.
Griffin Wheel Co.
Illinois Steel Co.
Mt. Vernon Car Mfg. Co.
Pressed Steel Car Co.
Railway Steel Spring Co.
Standard Steel Works Co.

Wheels, Cast Iron, Chilled Tread.
Assn. of Mfrs. of Chilled Car Wheels.
Graybar Electric Co.
Griffin Wheel Co.
Mt. Vernon Car Mfg. Co.
Pressed Steel Car Co.

Wheels, Mine Car.
Carnegie Steel Co.
Edgewater Steel Co.
Griffin Wheel Co.
Mt. Vernon Car Mfg. Co.
Standard Steel Works Co.

Wheels, Passenger Car.
Carnegie Steel Co.
Illinois Steel Co.
Edgewater Steel Co.
Griffin Wheel Co.
Pullman Car & Mfg. Corp.
Standard Steel Works Co.

Wheels, Steel and Steel Tired.
American Locomotive Co.
American Steel Foundries.
Carnegie Steel Co.
Edgewater Steel Co.
Illinois Steel Co.
Lima Locomotive Works.
Railway Steel Spring Co.
Standard Steel Works Co.

Wheels, Wrought Steel.
Armco Railroad Sales Co.
Bethlehem Steel Co.
Carnegie Steel Co.
Edgewater Steel Co.
Standard Steel Works Co.

Whistles.
Ashton Valve Co.

Whistles, Locomotive.
General Electric Co.
Westinghouse Air Brake Co.

Window Fixtures.
Edwards Co., O. M.
Tuco Products Corp.

Wire.
American Steel & Wire Co.
Kerite Insulated Wire & Cable Co.

Wire, Fence.
American Steel & Wire Co.

Wire, Insulated.
American Steel & Wire Co.
Anaconda Wire & Cable Co.
General Electric Co.
Graybar Electric Co.
Kerite Insulated Wire & Cable Co.

Wire, Rail Bond.
American Steel & Wire Co.
Graybar Electric Co.

Wire Rope Clips.
American Steel & Wire Co.

Wire Rope.
American Steel & Wire Co.

Wire, Telephone & Telegraph.
American Steel & Wire Co.
Anaconda Wire & Cable Co.
Graybar Electric Co.

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Wood Preservative — (See Preservative, Wood).

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	1929	1923	Per Cent Inc.	Per Cent Dec.
Gross ton-miles (millions)	33,126	22,405	48	..
Freight train-miles (thousands)	10,388	10,286	1	..
Freight train-hours (thousands)	760	964	..	21
Gross tons per train	3,189	2,178	46	..
Average train speed	13.7	10.7	28	..
Gross ton-miles per train-hour	43,604	23,243	88	..
Cost per thousand gross ton-miles (cents)*	36.1	70.2	..	49

*The cost per thousand gross ton-miles includes road freight wages, fuel, supplies and enginehouse expenses.

Due to the improvement in freight train operation, 1929 over 1923, there was a saving of 34.1 cents per thousand gross ton-miles. On the basis of the gross ton-miles produced in 1929 (33,126,000,000), this amounts to a total saving of $11,295,966.

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